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General Article

"SWAY-BACK"—A DEMYELINATING DISEASE OF LAMBS WITH AFFINITIES TO SCHILDER'S ENCEPHALITIS IN MAN*

J. R. M. INNES
INSTITUTE OF ANIMAL PATHOLOGY,
CAMBRIDGE UNIVERSITY

I.—Introduction

Whether animals are insusceptible to many of the nervous disorders which afflict man is as yet not fully known. A consultation of any textbook on nervous diseases in man (Brain, 1933) will show, however, that there are numerous types of nervous disorders which either do not occur in animals or have not yet been described. A few of the diseases which come into this category are the various congenital and hereditary ataxias, while it seems that gliomata and vascular disorders are rare in the lower animals. By the identification of viruses with certain forms of encephalitis in man and animals our knowledge of nervous diseases has been augmented. Recent work in this field has shown that progress has been greatly helped by the ability to study these virus diseases experimentally. The identification in animals of yet another type of nervous disease which in man has defied all attempts to explain its aetiology and genesis is, therefore, of importance apart from its direct veterinary interest.

As a sequel to the identification of virus infection with certain types of encephalitis, it has been possible to classify encephalitis into comparable groups based on the fundamental nature of the morbid process. Along these lines a classification has been suggested by Greenfield as follows:—

(1) Encephalitis in which the brain lesions, septicaemic in nature, are essentially the same as lesions in other parts of the body, *e.g.*, in typhus (the encephalitis in swine fever might possibly be included in this group).

(2) Encephalitis due to a neurotropic virus the path of infection in some of which is by the nerve axons: *e.g.*, poliomyelitis, rabies, Borna disease in horses, and louping-ill in sheep. The lesions due to neurotropic viruses are more marked in the grey than in the white matter in contrast to the localisation of these in the following group.

(3) Encephalitis of unknown aetiology, *e.g.*, post-vaccinal encephalitis, disseminated sclerosis, Schilder's disease and neuropticomyelitis (Devic), all of which are diseases so far recorded only in man.

It is a type of disease related to this third group with which this paper will be concerned. The essential lesion in the four named diseases of this group, which acts as the common link between them, is the idiopathic destruction of the myelin in white matter to which the term demyelination has been given. This lysis of white matter occurs either in scattered foci as in disseminated sclerosis or in massive areas as in Schilder's disease. So far all attempts to establish the aetiology of these diseases have failed; no specific organism or virus has been isolated and transmission to experimental animals has not been achieved.

It certainly appears that, in spite of the assertions of certain investigators (Lévaditi, 1930) that all demyelinating diseases are due to neurotropic viruses, no convincing evidence to support this theory has as yet been produced. The position appears to be unchanged since 1932 when Rivers stated that there had been no authentic instance in which a known virus acting directly on the nervous system had produced demyelination of the type occurring in diseases such as disseminated sclerosis, Schilder's disease and canine distemper; further, that when well recognised viruses did attack the brain and cord, demyelination was not found (see also Hurst, 1936). The latter worker is of the opinion that fundamentally the aetiology of demyelinating diseases is probably one problem and not several.

Furthermore, it has not yet been found possible to reproduce experimentally with consistency the anatomical entity of demyelination, although Perdrau and Pugh's (1930) observation of this lesion in certain nervous forms of distemper in the dog, raised hopes in this direction which, however, have not been fulfilled. These workers could not associate the demyelination with the virus of distemper and suggested that it was caused by a toxin circulating in the blood. Dawson (1916) had previously suggested that a toxin in the blood might be the cause of the same type of lesion in disseminated sclerosis in man. In this connection it is interesting to note that Meyer

*A preliminary communication of this investigation was published in the *Proc. Roy. Soc. Med.* (1936.) 29. 426 and a full detailed account of the pathology in the Fourth Report Inst. Anim. Path. Camb. University.

(1928) has shown that demyelination occurs in carbon monoxide poisoning and that Ferraro (1933) claimed to have produced demyelination in the cerebrum of monkeys and cats by subcutaneous injections of potassium cyanide.

More recently Rivers (1936) has produced demyelination in monkeys, by the injection of extracts of rabbit brain (heterologous tissue) although the mechanism by which this was brought about was not understood. These three observations (Meyer, Ferraro and Rivers) are of great interest as they might offer some avenue of approach to an experimental study of the genesis of demyelination (biochemical and histological).

The slow progress in the elucidation of these human diseases has been partly due to the lack of opportunity to study them experimentally, so that neuro-pathologists have been compelled to restrict their attention to the static pathological pictures, usually end stages, seen at autopsy. It is apparent, therefore, that the identification of any spontaneous demyelinating diseases in animals, particularly if it occurs with any frequency, might be of importance, not only for its veterinary interest but also as a possible source of help in the elucidation of the aetiology of analogous diseases in man.

So far, however, the only condition known to occur in animals which is analogous to any of these demyelinating diseases in man is Schilder's disease in the monkey of which rare cases have been described by Perdrau (1930), Levaditi, Lepine and Schoen (1930), Schob (1931) and Scherer (1932). The disease apparently was not transmissible to monkeys.

The present study of the pathology of "sway-back" in lambs indicates that it is a disease of the nervous system which is, as yet, without a parallel in the realm of veterinary pathology. As will be shown later it closely resembles Schilder's disease in man; for this reason a short summary of the principal clinical and pathological features of the latter is given for the purpose of comparison. (*See* Collier and Greenfield (1924), Stewart, Greenfield and Blandy (1927), Brain (1933), Brain and Strauss (1934) and Bouman (1934). Through the kindness of Dr. A. Meyer, of the Maudsley Mental Hospital, London, specimens of Schilder's disease have been available for personal study.)

The disease was first described by Schilder (1912) and designated as *encephalitis periaxialis diffusa* and since then by numerous other workers, many of whom have suggested a different nomenclature.

The disease usually occurs in children and young subjects, and is generally non-pyrexial throughout its course. Remissions sometimes occur, but it is invariably fatal in a few months to a few years. The most important clinical symptoms which are said to be unrepresented in any other disease as a triad are progressive blindness of the cerebral type, progressive spastic paralysis and mental deterioration. Unsteadiness, loss of sense of position and deafness may also occur. Although the majority of cases appear to arise sporadically, a familial incidence is being increasingly recognised (Symonds, 1928; Meyer, 1936).

The outstanding pathological feature is the massive bilateral destruction of white matter in the cerebrum, commonly starting in the occipital poles and spreading anteriorly through the white matter. In advanced cases the *corpus callosum*, the frontal and temporal poles may be affected. Thus, according to the stage at which the disease is seen it may affect a part of a lobe, a whole lobe or a whole hemisphere, and in the majority of cases both sides of the brain are involved. This degeneration often stops at a short distance from the cortical grey matter and the border line may thus extend over a wide territory parallel with the cortex. Frequently other parts of the nervous system may show small foci of demyelination and secondary degeneration may be found in the spinal cord. As a result of the widespread degeneration in the cerebrum the white matter is converted into a greyish, yellow to brown soft translucent gelatinous substance or sometimes of a hyaline nature. The grey matter is relatively well preserved. Subsequent to the demyelination, or coincident with it, the axis cylinders are destroyed. In degenerated areas a reparative process occurs by glial cell proliferation with the production of a felt work of fibrils (gliosis). A diffuse infiltration of phagocytes containing fat globules derived from the broken-down myelin usually occurs in the degenerated white matter. Infiltrations of these cells, lymphocytes, &c., into the perivascular spaces may be absent, mild, moderate or severe.

II.—Historical

"Sway-back," "swing-back," "swingle-back" or "jink-back" are names which were probably given by shepherds to a disease of young lambs on account of the outstanding symptom, namely, inco-ordination. While records of the disease have only recently appeared in the literature there can be no doubt that it has been known to farmers in England for generations.

"Sway-back" appears to be similar to a disease in lambs, which was described by Gaiger (1917) as occurring in Peru, characterised by inco-ordination of movement and tremors of the head. The majority of the animals died but some made a partial recovery. Gaiger stated that the disease bore some resemblance to "swing-back" in England, but owing to the lack of knowledge concerning the pathology of both diseases it was at that time uncertain how far this similarity existed. The aetiology and pathology of the Peruvian disease were not determined.

Magnusson (1920) also recorded a disease of young lambs in Sweden which appears very similar to "sway-back." The disease occurred in young lambs, paralysis and inco-ordination being the outstanding symptoms. The pathology was not determined although macroscopic lesions were not observed in the nervous system. Attempts to isolate a causal organism and to transmit the disease failed and no other aetiological factor was identified. Magnusson stated that the disease appeared similar to diseases of sheep in England in which paralysis occurred such as louping-ill, scrapie and "swing-back." At that time, however, little was known about any of the diseases in question.

Lyle Stewart (1932) reported the results of his investigation into the nature of "sway-back" in lambs occurring in this country. This worker made bacteriological examinations of two cases with negative results and demonstrated degeneration in the ventral and lateral columns of the spinal cord in both cases. By comparing the localisation of these degenerated tracts with those of man it was concluded that these represented degeneration of ascending tracts only. There is no mention of any histological examination of the brain although macroscopically they were stated to be normal.

A disease of young lambs which appears identical with "sway-back" in England (age incidence, prevalence, symptoms and inability to incriminate either bacteria or viruses as causal factors) has been described by Bennetts (1932) in Australia as "enzootic ataxia." This worker also observed degeneration in the ventral and lateral columns of the cord and he too came to the conclusion that only the ascending tracts were involved. The histological examination was restricted to the use of a few methods and no mention was made of any examination of the brain. Two hypotheses were advanced to explain it aetiology, (*a*) that the disease was due to a dietary deficiency, (*b*) that it was due to a cumulative toxic principle excreted in the milk of ewes under certain conditions and exerting a toxic effect on the progeny. In a later paper Bennetts (1933) suggested that dietary deficiencies could be excluded, while in 1935 he stated that the evidence pointed to the disease being due to poisoning. The possibility that lead might be the poison was also considered.

Following the publication of Lyle Stewart (1932) concerning "sway-back" in England, Dunning (1933) reported that "sway-back" closely resembled a condition occurring in young lambs in South Africa. The disease apparently only occurred in isolated areas and symptoms of paralysis usually appeared when the lambs were about six weeks old; the majority of the animals died. No extensive investigation had ever been made into the pathology or aetiology of the disease but a *post-mortem* examination of one lamb by Dunning was said to reveal no lesions; no mention is made of the nervous system having been examined. Krisnnapa (1936) in a brief communication records a disease in India occurring in newly-born and young lambs which was diagnosed as "swing-back." In the localities concerned the disease was well known, affected lambs showing inco-ordination and paralysis. No causal organism was isolated from cases of the disease and it was concluded that some toxic substance in the ewe's milk was the causative agent. No gross lesions were observed in the brain. [The absence of macroscopic changes in the nervous system in "sway-back" has been a constant observation by all the above workers (Gaiger, Stewart, Magnusson, Bennetts, Dunning, and Krishnapa) and is, therefore, of interest in view of the large number in the present series which likewise showed an absence of naked-eye lesions.]

It thus appears probable that a disease comparable to "sway-back" in England has occurred in South America, Sweden, Australia, South Africa and India. The fact that the nervous system was not examined in detail by any of the above workers and the consequent lack of exact data concerning the pathology makes it difficult to draw any strict comparison. (From correspondence with Professor Nieberle, in Leipzig, it appears that the disease has so far not been observed in Germany). The similarity in the symptoms, the age incidence, the general history of the disease, and the inability of any of the workers concerned to incriminate any organism or virus in the aetiology appears, however, very suggestive. The disease apparently occurs in those countries in which sheep rearing is intensively carried out, although, from general accounts, there remains the puzzling feature that "sway-back" does not occur in Scotland. This latter point must be confirmed.

III.—Present Investigation

(*a*) MATERIAL AND METHODS.

In the spring of 1935, 32 affected lambs were received from several outbreaks. Some were killed for immediate autopsy while others were kept under observation until death occurred. It was thus possible to examine affected lambs of ages varying from twelve hours to twelve weeks.

All animals were autopsied in the routine manner. In many cases a bacteriological examination of the blood, various visceral organs and the central nervous system, using a wide variety of cultural methods, was carried out. In some other cases a chemical examination of certain organs was made. From certain animals small portions of the nervous system were taken under sterile precautions for subsequent inoculation into normal lambs. The entire nervous system in all affected animals and the visceral organs of many were subjected to a rigorous histological examination.

(*b*) EPIZOOTIOLOGY AND SYMPTOMS.

From the histories of various outbreaks it appeared that the disease was comparatively widespread throughout England and Wales. The cases examined were received from 16 farms situated in seven counties (Buckinghamshire, Northamptonshire, North Wales, South Wales, Worcestershire, Leicestershire, Bedfordshire). It has been observed, however, in many other counties where it has occasioned serious losses in young lambs, *e.g.*, Gloucestershire, Wiltshire, Derbyshire, Yorkshire, Suffolk, Lincolnshire, Rutlandshire, Cardiganshire, Northumberland, and border counties of Scotland. In some flocks the percentage of animals affected varied from 10 to 50, but in others only a few cases occurred. In exceptional cases the incidence may, however, be as high as 90 per cent. On some farms outbreaks had occurred each season for a number of years but on others it was noted for the first time in 1935. Many farmers are of the opinion that the disease has been increasing in prevalence for a number of years, more particularly since 1933. It has been suggested by many flock-owners that the progeny of the Border Leicester ewe is more susceptible than that of other breeds. It should be pointed out, however, that numerous cases have been observed in Suffolk, Masham, Wensley Dale Cross, Southdown and Welsh mountain sheep. As an illustration that breeding does not necessarily play a part in the aetiology of the condition the following history of its occurrence on a particular farm may be of interest since it is typical of a number of outbreaks. The farmer had been in possession of the farm for three years (1933-35); in 1933, 150 Wensley Dale Cross ewes were mated with Oxford rams and in that year the disease did not occur but in the following year 76 lambs from the same parents were affected; in 1935 the original ewes were mated with Suffolk and Hampshire rams and 55 cases occurred in the progeny of both types of ram. Many other similar histories indicate that the disease is not confined to the progeny of a particular breed of ewe or ram and that variation in crossing has no influence on the prevalence of the disease. The number of affected lambs in the above-mentioned flocks gives some idea also of the serious nature of some outbreaks.

There is evidence to show that the older ewes are more prone to give birth to affected lambs. For example, the careful records of one farmer showed that in the 1934 lambing season the large majority of cases were lambs born from ewes which had had three to four previous lambings. Out of the 52 recorded cases only two were from first-lamb ewes. (In some ways this feature is comparable to the occurrence of mongolism in the children of large families.)

It is not definitely known if a ewe which has once given birth to a "sway-back" lamb invariably produces an affected lamb the following year. Either sex and both of twin lambs may be attacked by the disease. While many lambs are affected at birth some do not show symptoms until they are a few weeks old; both these types have been included in the series examined. In our experience the latest age at which symptoms have occurred is six weeks.

SYMPTOMS.

Whether the animal is visibly affected at birth or does not show signs until later the symptoms are essentially of the same nature, varying only in severity. All affected lambs show inco-ordination of movement, some are totally unable to walk or stand, while others are able to rise with difficulty and walk with a staggering gait. It is probably on account of this inability to walk and reach the ewe that some farmers state the lambs are unable to suck, but affected animals can readily be bottle fed and there is no interference with the sucking reflex. No characteristic posture is adopted by those animals which cannot walk apart from extension of the hind limbs, but they make occasional spasmodic attempts to attain a standing position. Some of them sway if placed on their feet and collapse after a short time or when attempting to move. Although ataxia is always definite and often severe there is no flaccid paralysis. Spasticity of the limbs, particularly the hind limbs, is constant and strong muscular contractions are easily elicited by squeezing the digits together—the so-called pedal reflex. Tremors of various parts of the body are occasionally seen and some lambs sway their head when in a lying position. The corneal and pupillary reflexes are nearly always positive, but many of the more severely affected animals show blindness which symptom, as will be seen later, is central in origin. The disease is unassociated with fever except in the terminal stages when intercurrent infection may occur.

In those cases which were kept in the Institute and artificially fed in order to observe the course of the disease the symptoms became progressively worse and death occurred in from five days to a few weeks from broncho-pneumonia. Under natural conditions the survival period may be much shortened owing to neglect and exposure, since the lambs are unable to reach the ewe to feed. Most of them, however, are killed by the farmer as soon as they are seen to be affected as it is not economical to carry out artificial feeding and, in any case, a fatal termination is to be expected in many cases. In the mildest type of the disease lambs show only a swaying of the hind-quarters and unsteadiness when walking, and in many such cases the symptoms do not progress. (A case of "sway-back" has been reported to me which had shown only mild

symptoms; this animal recovered and ultimately gave birth to a normal lamb!)

The essential manifestations of the disease are thus a spastic diplegia particularly of the hind limbs, varying in severity, an absence of flaccid paralysis, sometimes blindness, a progressive course unassociated with fever and a generally fatal termination in many cases in spite of artificial feeding.

It might be mentioned here that in the diagnosis of nervous disorders the veterinarian is greatly limited in his clinical methods. For this reason any type of paralysis in young lambs might be easily confused with "sway-back." During the investigation two lambs were examined which had been forwarded as typical cases of "sway-back." On autopsy in both cases the cause of the paralysis was found to be a suppurative osteomyelitis involving a large area of the body of a thoracic vertebra with local extension to the meninges and cord (meningo-myelitis).

(*c*) PATHOLOGY.

(1) Anatomical Findings

A careful examination was made of the whole body in every case. Except in a few cases in which the liver and kidneys showed moderate fatty degeneration the lesions were confined to the central nervous system. The condition of the visceral organs of the four animals which were allowed to die will be dealt with separately, but the lesions present were undoubtedly terminal and not directly related to the primary disease in the nervous system.

Gross muscular atrophy was never observed.

Changes in the Nervous System.—Gross changes were present in the brain of 11 of the 32 cases and from the different appearances which were presented it was possible to obtain an indication of the development of the lesions during the course of the disease. The most severe types of lesions as observed in seven of the eleven animals will be first described.

As there were only minor variations in the extent and severity of the changes in these seven cases the following description can be applied to all of them. The bones of the cranium were thin and easily cut and on opening the brain cavity a large quantity of clear cerebro-spinal fluid flowed out from a greatly dilated subarachnoid space which was about 1·5 to 2 cm. in depth over the superior pole of the cerebrum. The cerebral hemispheres were atrophied and retracted from the skull, the convolutions appeared poorly developed and the sulci were shallow and indeterminate. The brain substance was sodden and flabby, so that great care was necessary to prevent laceration when the brain was lifted from its attachments. Fluctuation could be felt on gentle palpation of the hemispheres, and pitting occurred on slight pressure. No lesions were observed in the meninges and there was no congestion of the vessels at the base of the brain or of those on the upper surfaces. Similarly, no lesions could be detected by a superficial examination of the cerebellum, hypophysis, brain stem, chorioid plexus of the fourth ventricle, spinal cord throughout its length, or peripheral nerves. After fixation the brains were sliced by even vertical transverse sections from the olfactory lobes to the medulla. By this procedure symmetrical degeneration of the cerebral white matter was disclosed. The white matter was replaced either by a translucent greyish gelatinous substance or by a clear fluid contained in cavities. Transitions between these could be seen in the brain at different levels and it appeared that cavity formation was the end stage of the process.

In the case illustrated in fig. 1 (overleaf) large cavities extended from the occipital to the frontal pole in both hemispheres. In many of the smaller cavities, shreds of degenerated white matter formed a fine lace-like web across the lumina. The central white matter of the hemispheres was thus greatly reduced in amount, but not to so marked an extent in the frontal pole as posteriorly. The internal capsules were distinct but thinned. The *corpus callosum* on transverse section appeared greatly wasted and was reduced to a thin line less than a fraction of a millimetre in thickness. The *septum pellucidum* was of the thinness of tissue paper and was split into its composite halves with the formation of the *cavum septi pellucidi* or so-called fifth ventricle (never seen in normal young lambs). The grey matter on the whole was well preserved as a thin shell around the grossly degenerated white matter. The lateral ventricles were dilated and communicated with some of the cavities in the occipital poles by small perforations through their thinned walls; the ependymal lining was smooth and no abnormality was observed in the choroid plexus. The fourth ventricle was not dilated and there was only slight dilatation of the aqueduct. There was no indication that the moderate internal hydrocephalus was due to an obstruction of the flow of cerebro-spinal fluid. The basal ganglia, thalamus, midbrain, pons, cerebellum, medulla, and spinal cord (the latter cut at many levels) all appeared normal.

In four of the eleven cases all gradations were observed varying from foci of softening of the white matter localised in the occipital poles, to diffuse involvement of the whole hemispheres. The division of the cases into two groups is, therefore, purely arbitrary but serves to emphasise the divergence of the pathological picture.

It was obvious from the localisation and different degrees of development of the lesions in these eleven cases that there was a tendency for the process to begin in the occipital poles of

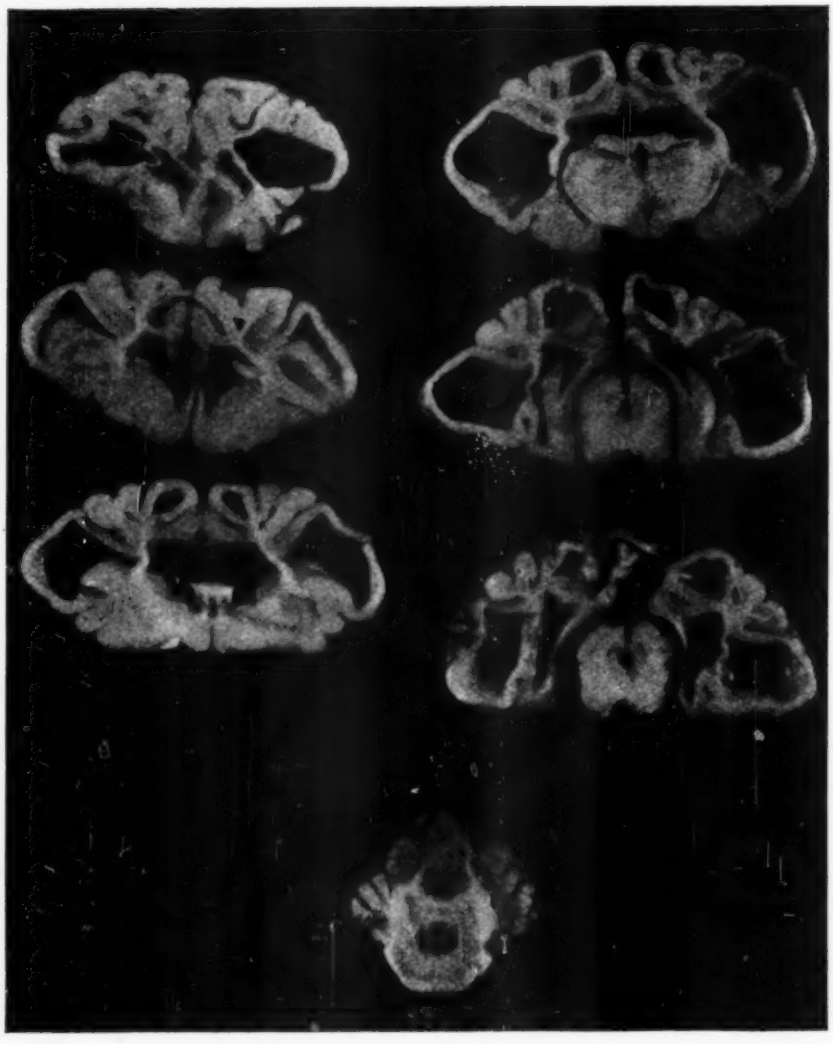


Fig 1.—" Sway-back " Lamb, 18 days old, male, affected at birth, killed in moribund condition. Gross symmetrical degeneration of cerebral white matter with extensive porencephalic cavity formation; cavities extend from anterior to posterior poles of hemispheres; wasting of corpus callosum; internal hydrocephalus with only slight dilatation of third ventricle; relative preservation of grey matter; no changes in midbrain, cerebellum or brain stem. Coronal sections of brain from anterior to posterior poles in sequence from above and below. Natural size.

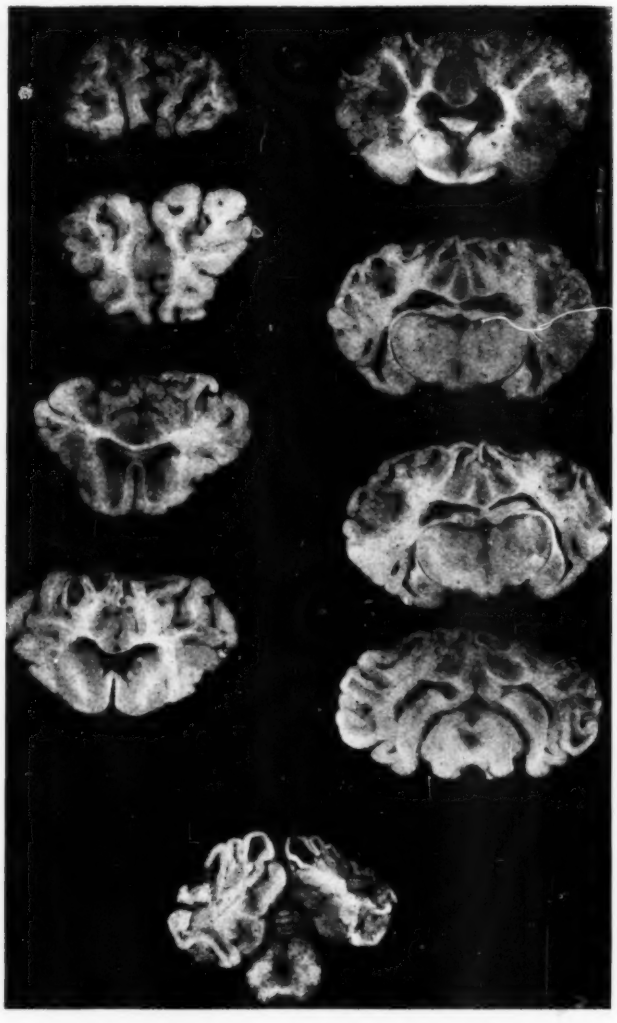


Fig. 2.—" Sway-back " Lamb, 21 days old, male, symptoms first appeared one week previous to being killed. Compare with fig. 1; symmetrical degeneration is marked but not so severe; cavity formation of a minor degree; the degenerated white matter was replaced in this case by a translucent gelatinous substance very similar to that seen in Schilder's disease in man; the lesions are more marked in the occipital poles and recede in severity as the frontal poles are approached where the white matter appears distinct and normal. Coronal sections of brain. Natural size.

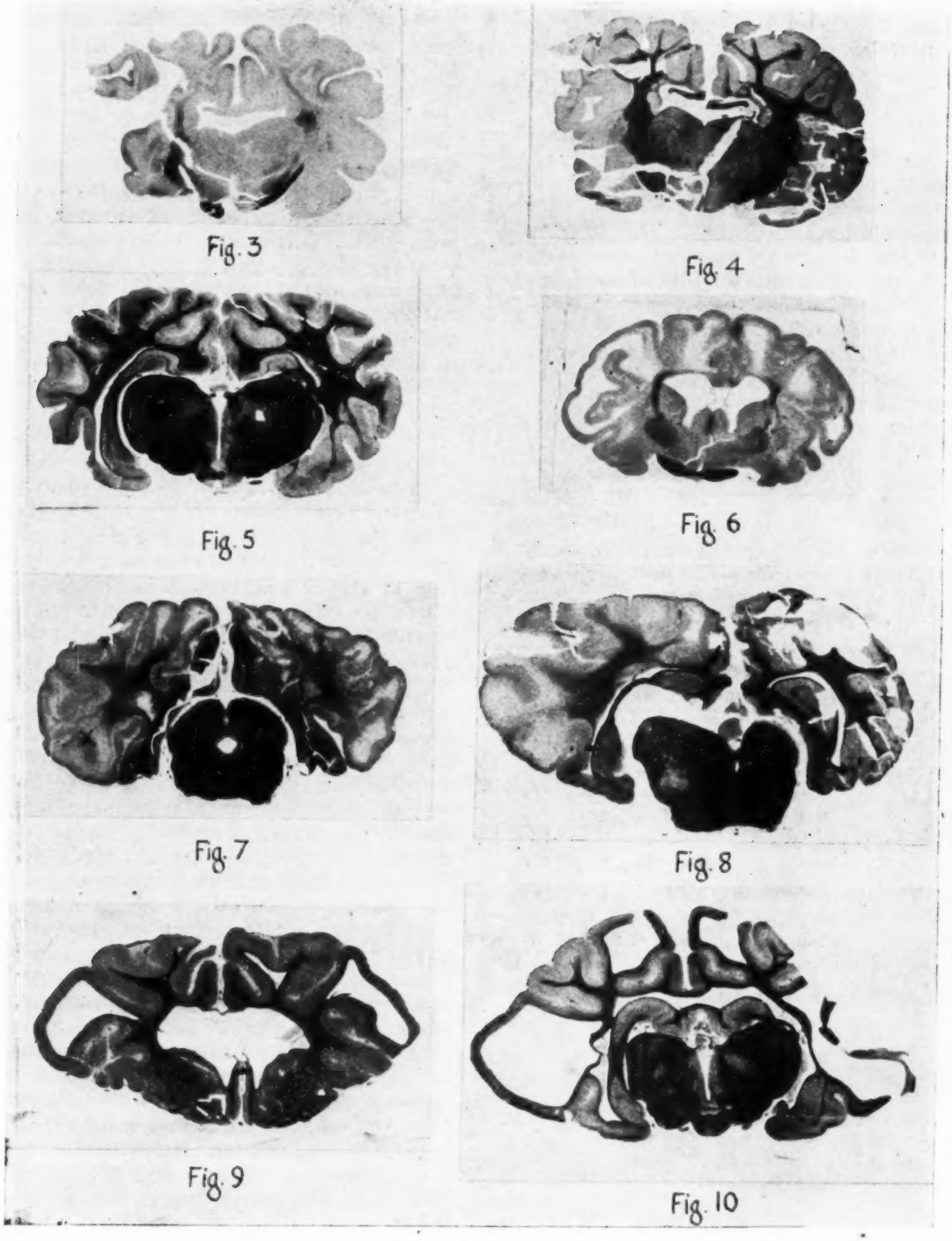
the hemispheres and to progress in an anterior direction. In one case, only the occipital poles were affected. They were soft and flabby to the touch and on cross-section the gelatinous nature of the white matter was clearly visible. These changes diminished in intensity as the frontal poles were approached, where the brain appeared normal (*see* fig. 2).

In 21 of the 32 cases no abnormalities were observed in the cranial cavity, meninges, brain or spinal cord. The grey and white matter throughout was clearly demarcated, well preserved and apparently normal in amount and distribution. (This large percentage of cases showing an absence of naked-eye lesions demonstrates the necessity in such diseases for a rigorous histological examination; otherwise the conclusion might be that the nervous system was not involved in the disease process.) In none of the 32 cases examined were changes observed in the peripheral nerves including all the main branches of the brachial and sciatic plexus and of the cranial nerves.

The following is a summary of the changes observed in the viscera of one animal of the four which were kept and allowed to die:—

Case 5.—Female: affected at birth: two days old when received: death ten days later: autopsy within three hours of death.

Anatomical diagnosis.—Empyema and purulent pleurisy right side; miliary abscesses in lungs, liver, spleen and kidneys; bronchopneumonia; gross atrophy of brain; symmetrical gelatinous degeneration of cerebral white matter with porencephalic cavity formation; moderate dilatation of lateral ventricles.



FIGS. 3-10.—*Coronal sections of the cerebral hemispheres from normal lambs and from cases of "sway-back."* Stained to show white matter degeneration. Normal white matter black; grey matter and degenerated white matter unstained.

FIG. 3.—Foetal lamb, about 15 weeks. Compare extent of myelination with that of normal one day old lamb and three weeks old lamb (figs. 4 and 5).

FIG. 4.—Normal one day old lamb.

FIG. 5.—Normal three weeks old lamb.

FIG. 6.—"Sway-back," male, two days old, affected at birth, killed. Compare with normal lambs (figs. 3-5); diffuse bilateral degeneration of hemispheres to the extent of almost complete loss of myelin, with the exception of the optic tracts; slight dilatation of lateral ventricles; small cavities present.

FIG. 7.—"Sway-back," male, three weeks old, symptoms first appeared one week previous to being killed (from case illustrated in fig. 2). No demyelination in midbrain; diffuse demyelination of hemispheres.

FIG. 8.—"Sway-back," female, two weeks old, affected at birth. Changes similar to fig. 7, but demyelination is more marked on left side.

FIGS. 9 and 10.—Sections from case of "sway-back" illustrated in fig. 1. Cavity formation and ventricular dilatation marked: Frontal lobes (fig. 9); Occipital lobes (fig. 10).

The other three animals which died all showed similar lesions in the viscera indicative of a terminal septicaemia and/or bronchopneumonia but without gross changes in the nervous system.

II.—Histology

A very brief summary of the histological findings is given for the sake of continuity. The lesions were confined entirely to the nervous system. In the latter no changes were ever present indicative of an encephalitis or meningoencephalitis in the true sense of the word (*e.g.*, inflammatory cell infiltration, haemorrhages, thrombi, meningeal changes were totally absent). The essential and characteristic change observed in the brains of affected lambs was the destruction of white matter and this was present whether such changes had been visible to the naked eye or not. In those cases where no naked eye changes were observed small foci of degeneration were visible histologically. All stages in severity of the degeneration could be traced in different cases ranging from such foci to diffuse bilateral degeneration of the white matter. In some cases the damage had been so severe that with appropriate stains little or no trace of healthy white matter remained in any part of the cerebral hemisphere (*see* figs. 3-10). In such cases liquefaction had occasionally resulted in the production of porencephalic cavities often with a concomitant dilatation of the ventricles. As a result of the cerebral lesion a secondary degeneration of the descending motor tracts had resulted, degenerated fibres being seen in the brain stem and as far as the lower levels of the cord. In all cases the preservation of the grey matter was an outstanding feature. An attempt at repair of the damage done was evident by the glial cell proliferation with the production of a fibrillary network in and around degenerated areas.

All these lesions described are in distinct contrast to those which are known to be produced by known inflammatory excitants such as bacteria and viruses, *e.g.*, in louping-ill, rabies, Borna disease and bacterial encephalitis.

For a more detailed description of the histological lesions see Innes (1936).

(*d*) BACTERIOLOGY.

(1) Cultural Experiments

In four animals which were autopsied a thorough examination of the various organs, blood, brain and cerebro-spinal fluid was made, using a wide variety of cultural methods. The majority of the cultures remained sterile or showed growths of contaminating bacteria only; no specific organism was isolated from any case. These findings are in accordance with those obtained from repeated examinations made in previous years commencing in 1927 and also with those of Lyle Stewart (1932) and Bennetts (1932-33).

(2) Transmission Experiments

As part of the investigation in 1935 and also in previous years, attempts were made to transmit the disease to healthy lambs of ages varying from a few days to a few weeks. Emulsions of different visceral organs, blood, the central nervous system, and the cerebrospinal fluid from seven affected cases were inoculated into ten lambs of varying ages (new born—three weeks) by different routes (intravenous, subcutaneous, intraperitoneal, subdural and intracerebral). All inoculated lambs remained healthy and showed no sign of the disease at any subsequent period. It was, therefore, concluded that bacteria and viruses are not concerned in the aetiology of the condition.

IV.—Discussion

"Sway-back" is a disease of the nervous system of a type which has not been described hitherto as occurring in domestic animals. The same essential lesions were observed in the brain and cord of all cases examined whether manifest to the naked eye or not. These changes were the characteristic degeneration of white matter in the cerebrum and of the descending motor tracts.

As ataxia was present at birth in many cases it was obvious that the disease had originated in the foetus and this was confirmed by the finding of severe lesions in the brains of lambs only three days old. The severity and extent of the lesions, however, bore no relation to the age of the lamb. For example, some animals which died at ages varying from five days to two months showed no macroscopic changes in the brain nor did others which were killed at ages up to three months. On the other hand, gross cerebral damage was seen in lambs as young as three days, and as old as one month. It cannot be assumed, therefore, that those cases in which no naked-eye lesions were present represented early stages of the disease which would have progressed to a common end point (gross degeneration of white matter with liquefaction and cavity formation) if the animal had lived long enough. It is most probable that the differences in the severity of the damage were caused by variations in the initial intensity of the pathogenic process and that there are, therefore, acute and chronic types of the disease. In the mildest cases it is reasonable to assume that the damage in the cerebrum and motor paths might be so slight that compensation might be effected by the development of secondary motor paths arising from a level lower than the cerebral cortex. Although some animals did not show symptoms until some time after birth it is possible that even in these cases the disease process also originated *in utero*.

The localisation of the lesions to the white matter with relatively good preservation of the grey substance need not be considered in any

particular light. It is an old observation that in various diseases certain regions and structures are involved to the exclusion of others. Similarly the occurrence of the cavities appears to be explained by the general immaturity of brain tissue in lambs when the disease begins. It appears to be well recognised that young immature brains react to rapid destruction of white matter in this manner while in the adult brain scar tissue production predominates.

The marked dilatation of the lateral ventricles which was seen in some cases is probably analogous to that which accompanies gross atrophy of the brain in man, *e.g.*, in congenital and senile atrophy. It has also been recorded in cases of Schilder's disease in man by Bouman (1934). The suggestion has been made that this increased volume of cerebro-spinal fluid in such cases is compensatory for the free space produced by the cerebral atrophy. It appears certain that in "sway-back" it is not due to any increase in ventricular pressure as there is no evidence of occlusion at any part of the ventricular system in the lambs' brains.

The tracts which were found to be degenerated could be traced through the brain stem to the lower levels of the cord. The location of these in the spinal white matter was identical in situation to the descending motor tracts in the sheep, described by King (1911). Further, the degeneration in the spinal cord described by Lyle Stewart (1932) in "sway-back" and by Bennetts in the similar disease of lambs in Australia appears identical in type and location with those in this series of cases and to those described by King. Both Lyle Stewart and Bennetts inferred, however, from a correspondence with the motor tracts in man that the cord degeneration represented an ascending type. The work of King and others has shown that such direct inference cannot be made.

The spastic paralysis, inco-ordination and occasional blindness which occur in "sway-back" are thus explained by the cerebral lesions.

There appear to be many pathological and clinical features common to "sway-back" and Schilder's encephalitis in man, of which the following are the most important: (*a*) The diffuse symmetrical degeneration of white matter, (*b*) the relative preservation of the cortical grey matter, (*c*) the blindness in some cases of "sway-back," (*d*) the spastic paralysis and inco-ordination of movement, (*e*) the progressive course and often fatal termination, (*f*) the obscure aetiology in which bacteria and viruses appear to be excluded. Nevertheless, many authorities believe that the reaction of the brain to noxae is limited and that similar lesions may be produced by different pathogenic factors and that Schilder's disease in man belongs to this category. In conformity with this view it is permissible to regard "sway-back" as a disease process which is parallel to the Schilder's type.

Aetiology.

Attempts to incriminate bacteria or viruses have been unsuccessful. This is in strict accordance with the experience of other workers (Lyle Stewart, Gaiger, and Bennetts in Australia). This negative finding is of importance as it is in line with the experience of all workers who have tried to identify bacteria or viruses with analogous diseases in man (disseminated sclerosis, Schilder's disease, etc.).

There is no evidence available to indicate that the disease is hereditary in nature. Lambs of many different breeds may be affected and the crossing of rams with ewes of various breeds does not appear to influence the incidence of "sway-back" in the progeny. There are also no grounds to support the idea that the disease might be developmental in nature. The high incidence, widespread occurrence and the type of lesion present appear to exclude this possibility.

Deficiencies of any of the recognised vitamins or of other food factors seem also to be eliminated from our consideration. The methods of feeding and rearing sheep are so diverse in the different localities in which the disease occurs that the existence of any common deficiency factor must be highly improbable. [The sheep is able to synthesise vitamins C, D (in the presence of light) and some of the B factors and as a result could hardly suffer from their absence in the food. In many cases abundant vitamin A reserves were present in the liver from cases of "sway-back."] If the disease is caused by some "toxin" at present unknown, then it must be carried in many cases by the ewe during pregnancy. During this period it causes no obvious disturbance in the health of the ewe but exerts an extraordinary pathogenic effect on the lamb. Under such conditions the "toxin" must then be of such a nature that it is able to pass freely through the placenta in order to reach the brain of the developing lamb. Even more puzzling is the fact that whatever the noxious substance may be it has a remarkable specific affinity for the white matter of the cerebrum which it destroys with unexampled celerity.

To some extent these conclusions are similar to those of Bennetts (1932) in Australia. He thought that the causal agent might be excreted through the ewe's milk and suggested the possibility of plant or mineral poisoning, and later stated that lead might be the poison involved. Analyses by Bennetts of the milk taken from "affected" ewes (ewes which had given birth to "sway-back" lambs) showed traces of lead, but small amounts were also found in the milk of normal ewes. On the hypothesis that lead might be responsible, "deleading"

experiments were carried out by administering ammonium chloride in the form of licks to pregnant ewes. (It is now known by the work of Aub and others that in chronic lead poisoning the metal is stored in the bones and that its metabolism and that of calcium tend to run parallel. Any substance which would, therefore, cause demineralisation of the bones would also cause the lead to be reliberated and excreted, *e.g.*, parathyroid extract and ammonium chloride.) This treatment of ewes during gestation in this manner apparently reduced the incidence of the disease in the progeny but in the absence of proof that "sway-back" was a form of plumbism the action of ammonium chloride as a prophylactic was left unexplained.

During the lambing season of 1936 a similar field experiment was carried out by the author in collaboration with Dr. J. Stewart of this Institute. Ammonium chloride was given to ewes mixed in with their food in amounts representing a dose to each ewe of 20 g. per day. A large number of ewes were used with suitable control groups on a farm in which the disease had occurred annually. The feeding was done over a period of the last eight weeks of pregnancy. There was little or no difference between the incidence of the disease in the progeny of either the experimental or control groups. As a further complication the incidence of "sway-back" in many farms in this locality was much lower during 1936 than in previous years. The results were, therefore, inconclusive in every way.

The possibility that "sway-back" is a peculiar form of (congenital?) plumbism must not be completely disregarded as there are some observations which suggest that this hypothesis is feasible. It has been shown, for example, in the case of rats, that lead can pass through the placenta into the foetus (Bauman, 1933) and that it may be excreted in the milk of lactating women and so cause poisoning of nurslings (Kasahara and Nosu, 1933). In Japan, congenital plumbism has been described owing to the pregnant mother having used cosmetics containing lead (Boyd, 1934). The human adult appears more tolerant to lead than young infants and in cases of lead poisoning of the latter, cerebral symptoms are common (Brain, 1934). Finally, it has been suggested many times that certain demyelinating diseases in man are due to a form of lead poisoning. On these grounds, therefore, it was considered advisable to investigate the possibility of lead being incriminated in "sway-back."

The brain and cord from a number of affected lambs were therefore analysed for lead by my colleague, Dr. J. Stewart, tissues from normal lambs being used as controls. Although lead was found in nearly all the brains of affected animals in amounts varying from 0·17 to 6 mg. per 100 g. dry weight of brain matter, traces were also found in normal brains. The significance of the lead in the brains was not understood because traces of the metal can often be found in tissues from apparently healthy individuals and animals. No conclusions can be drawn from this chemical part of the work and the question whether lead is concerned in the aetiology of "sway-back" still remains a matter of conjecture.

In any case, "sway-back" is so widely distributed that the usual origin of sporadic lead poisoning in man and animals (*e.g.*, water, use of lead pipes, factory refuse) can certainly be excluded as the occurrence of plumbism in other animals apart from lambs in the same areas would otherwise be expected. If lead is the responsible agent it must, therefore, be ingested in amounts insufficient to cause acute or chronic poisoning in the pregnant ewe but sufficient to cause severe damage to the brain of the developing lamb.

The position at present regarding the aetiology can be therefore summarised as follows. All the commonly known disease-producing agents appear to be excluded in the case of "sway-back," which are facts strictly comparable to those known about the analogous demyelinating diseases of man. From the facts available the possibility that a heavy metal or metals might be incriminated indicates that this avenue should be thoroughly explored.* It appears fairly certain that the disease process is initiated in the late stages of uterine development and/or shortly after birth. In this case it is reasonable to conclude that there is some inherent factor in the developing myelin of the brain in lambs (but not in that of the ewes), which renders it hypersensitive to "toxic" factors. In conclusion, it might be said that there are a large number of unanswered questions and statements which are only hearsay, regarding the epizootiology of the disease. It is therefore obvious that in such diseases of animals a survey of the disease throughout the country should always be undertaken as a preliminary to any intensive pathological investigation.

V.—Summary

"Sway-back" is a disease of the nervous system of newborn and young lambs which occurs in many parts of England and Wales. The incidence in some flocks may vary from 10 to 90 per cent. of the lambs born although in others only a few may be affected.

As far as symptoms, age incidence and

*In a personal communication Dr. Dorothy Russell, of the London Hospital, recently informed me that she has observed a case of severe cerebral demyelination in an adult, following the therapeutic administration of sulpharsphenamine. Attention has once again, therefore, been focussed on the heavy metals as being incriminated in the cause of demyelination.

general history of the outbreaks are concerned the disease appears similar to that described by Gaiger (1917) in Peru, Magnusson (1920) in Sweden, Bennetts (1932) in Australia, and Dunning (1933) in South Africa.

The symptoms of the disease are spastic paralysis particularly of the hind limbs, inco-ordination of movement, blindness in some cases, a progressive course (in many cases) unassociated with fever, and a generally fatal termination caused in some cases by an intercurrent infection.

The characteristic lesion is a diffuse symmetrical degeneration of the cerebral white matter varying from small foci to that of complete demyelination of the hemispheres. (In a large number of lambs lesions can only be seen histologically.) Secondary degeneration of the motor tracts is always present and can be traced to the lower levels of the cord. The disease is considered to be in the nature of a progressive degenerative disorder. In many cases the disease begins in the foetus and the possibility that it is always intra-uterine in origin cannot be excluded.

Many of the clinical and pathological features of "sway-back" resemble those of Schilder's disease in man.

Bacteria, viruses, breeding and deficiency factors are not concerned in the aetiology; "sway-back" is thus analogous in this respect to the demyelinating diseases of man.

The causal agent would, therefore, appear to be a "toxic" factor which is carried by the ewe during pregnancy and perhaps shortly after birth. This agent causes no obvious disturbance in the health of the ewe but only exerts a pathogenic effect on the foetus or young lamb.

The possibility that the heavy metals might be involved in the aetiology is discussed.

References

Bauman, Anny (1933.) *Arch. f. Gynak.* **153**. 584.
Bennetts, H. W. (1932.) *Austral. Vet. J.* **8**. 137; (1933.) *Ibid.* **9**. 95; (1935.) *J. Counc. Sci. Indus. Res.* **8**. 61.
Bouman, L. (1934.) "Diffuse Sclerosis." Wright; Bristol and London.
Boyd, W. (1934.) "Text-book of Pathology." Kimpton; London.
Brain, W. R. (1933.) "Diseases of the Nervous System." Oxford Univ. Press; London.
Brain, W. R., and Strauss, I. (1934.) "Recent Advances in Neurology," Churchill; London.
Collier, J., and Greenfield, J. G. (1924.) *Brain*, **47**. 489.
Dawson, J. W. (1916.) *Edin. Med. J.* **17**. 229.
Dunning, F. J. (1933.) *Vet. J.* **89**. 74.
Ferraro, A. (1933.) *Archiv. Neurol. Psychiat.* **29**. 1374.
Gaiger, S. H. (1917.) *J. Comp. Path.* **30**. 185.
Hurst, E. W. (1936.) *Brain*, **59**. 1.
Innes, J. R. M. (1936.) Fourth Report, Inst. of Animal Path., Cambridge.
Kasahara, M., and Nosu, Sh. (1933.) *Zschr. f. Kinderh.* **35**. 577.
King, J. L. (1911.) *Quart. J. exp. Physiol.* **4**. 133.
Krishnapa, K. S. (1936.) *Indian Vet. J.* **12**. 157.
Levaditi, C. (1930.) *Ann. Inst. Pasteur.* **45**. 673.
Levaditi, C., Lepine, P., and Schoen, R. (1930.) *C.R. Soc. Biol.* **104**. 986.
Magnusson, H. (1920.) *Deuts. Tierärtzl. Wschr.* **28**. 297.
Meyer, A. (1928.) *Z.f.d.g. Neurol. Psychiat.* **112**. 172; (1936.) *Brain*, **59**. 100.
Perdrau, J. R. (1930.) *J. Path. Bact.* **33**. 991.
Perdrau, J. R., and Pugh, L. P. (1930.) *Ibid.* **33**. 79.
Rivers, T. M. (1932.) *Archiv. Neurol. Psychiat.* **28**. 757; (1935.) *J. Exp. Med.*
Scherer, H. J. (1932.) *Z.f.d.g. Neurol. Psychiat.* **141**. 212.
Schilder, P. (1912.) *Ibid.* **10**. 359.
Schob, F. (1931.) *Ibid.* **135**. 95.
Stewart, T. G., Greenfield, J. G., and Blandy, M. A. (1927.) *Brain*, **50**. 1.
Stewart, W. Lyle (1932.) *Vet. J.* **88**. 133.
Symonds, C. P. (1928.) *Brain*, **51**. 24.

ACETYLCHOLINE AND VOLUNTARY MUSCLE

"The division of the various neurones of the autonomic system into adrenergic and cholinergic, according to the method by which they transmit excitation, is now familiar, and there is little difficulty in demonstrating that the corresponding substances adrenaline and acetylcholine act on tissues such as smooth muscle and glands in a way that agrees with their innervation. Although acetylcholine had been detected in the perfusion fluid from voluntary muscle under nervous stimulation, and although Prostigmin, which has such a dramatic effect in myasthenia gravis, was known to preserve acetylcholine from destruction in the tissues, there was until recently the utmost difficulty in definitely linking acetylcholine with the contraction of voluntary muscle. Applied to normal muscle it had no effect. Applied to muscle whose motor innervation had degenerated it produced a slow contracture which bore no apparent relation to normal muscular contraction, and which, if anything, seemed to discount the possibility of the substance playing a part under normal conditions. During the present year, Dr. Brown, Sir Henry Dale, and Dr. Feldberg* have been able to show that the failure of previous experiments was due to an insufficiently intimate contact of acetylcholine with the muscle-fibres. By isolating the artery to the gastrocnemius in the cat from all anastomotic connections, they were able to inject into it, with some force, a solution of acetylcholine which they knew would almost instantaneously penetrate every portion of the muscle. In these circumstances a twitch-like response of the muscle occurred which, though not so rapid as a twitch following nerve stimulation, resembled it sufficiently closely to show that it was a variety of the same phenomenon. They were also able to demonstrate a potentiating action of eserine, which inhibits the enzyme responsible for destroying acetylcholine, on the response of the muscle both to acetylcholine and nerve stimulation, but not to any other form of stimulation. The inference is plainly that the nerve impulse transmits its excitation to the muscle-fibres by liberating at the motor end-plate a small charge of acetylcholine. This rationalises the action of prostigmin in myasthenia gravis, suggesting that the disease is actually due to some failure in the transmitting function of acetylcholine."—*The Lancet*, October 24th, 1936, p. 994.

*Brown, G. L., Dale, H. H., and Feldberg, W. *Journ. of Physiol.*, 1936, lxxxvii, 394.

The Veterinary Record

December 26th, 1936.

A Merry Christmas to all our Readers

"SWAY-BACK" IN LAMBS

ONE of the first and most important functions of the research worker in the pathology of human beings, animals or plants, is the sorting out of different diseases which clinically are more or less alike. By the use of modern methods this task has become more sure, since a classification can often rest on an aetiological basis. Among the diseases of sheep which may be said to have succumbed to this endeavour during recent years may be mentioned lamb dysentery, braxy, louping-ill, and Rift Valley fever, while much light has been thrown on others. Much, of course, still remains to be done, and particularly is this the case with diseases in which there are no grounds for believing that a living agent is responsible. With these, as a first step in the process of discovery, it is essential that the nature of the deviation from the normal should be thoroughly explored. Not until this is accomplished is the investigator really in a position to take further steps to determine as exactly as possible the circumstances in which the natural disease arises, and to enquire whether a similar condition exists in other species. In the latter respect the student of human pathology has sometimes been at a disadvantage by comparison with the animal pathologist, and this is so especially in connection with some of the disorders of the nervous system, which are chronic and often fatal only at a late stage. While within certain limitations these disorders have been much studied in man, in the lower animals the study of those that do occur has been neglected, and for a very good reason. Investigations on the disease known in England and Wales as "sway-back," an account of which by Dr. J. R. M. Innes appears in this issue, are especially welcome, not only because the pathology of yet another sheep disease has been laid bare, but also because the similarity to a nervous affection of man of obscure aetiology has been recognised. On this achievement, the significance of which goes beyond the bounds of these Isles, Dr. Innes deserves our hearty congratulation. Here, then, is a clear instance of the value of taking a broad view. Now that a demyelinating disease closely similar to those occurring in man has been discovered in animals, a new line of attack has been opened up. There will now be an opportunity for a study of this naturally-occurring disease, the result of which should lead to a better understanding of some of the diseases which have for long baffled the neuropathologist.

Clinical Communication

AN INTERESTING CASE OF COLIC

J. W. MACAULAY, M.R.C.V.S., D.V.S.M.

Ngamiland Veterinary Station,
Maun, Bechuanaland

The following case was encountered while engaged upon routine administrative work. Practically no drugs or appliances were available and such drugs as were used were obtained from the stores of a neighbouring hospital.

Subject.—Exceptionally small police patrol mount, Welsh pony in type, six years old.

History and Early Symptoms.—*October 5th*, 1936.—Purchased at random. *October 7th.*—Given horse-sickness vaccine. *October 13th.*—Posted to station. Condition poor as supplementary ration of Teff hay barely recompensed for lack of natural grazing at the end of the dry season.

October 21st.—Symptoms of slight colic were observed, but abated without treatment.

October 28th.—Definite symptoms of colic, treated by the sole available medicament, linseed oil.

November 13th.—On my evening visit to the stables, the animal was reported to have spent the entire day rolling and pawing.

Examination.—From a distance, the pony was observed to have a crouching walk, to be continually lying and rising, groaning, and for considerable periods "dog-sitting" or lying on the back with the eyes closed and the legs drawn up. The eyes were found to be injected, the conjunctival sacs filled with grit; pulse 60; sweating at tail root, perineum, groin, etc.; borborygmus very slight and infrequent; greenish, moist stain on both nostrils; attempts at vomition were noted. No abnormality was

detectable on rectal examination; the rectum was ballooned and there were no faeces.

Diagnosis.—Acute distension of the stomach, due to pyloric or ileal obstruction.

Prognosis.—Unfavourable, in the absence of a stomach pump—doubtful, if one could be procured.

Treatment.—The tubing from three standard spray pumps (for locust eradication) was joined by means of two pieces of metal cut from the piston rod, or handle, of an ordinary bicycle inflator; fixation of this "stomach tube" to one pump gave a serviceable stomach pump. The tube was passed as usual and at the estimated moment of entry, a peculiar beat was felt in the tube; disconnection gave exit to a strong flow of greenish, foetid fluid, evidently under pressure as the few temporary blockages by ingesta were audible. About 2 gallons were syphoned off, to the manifest relief of the patient. Lavage with cold water, till clear, was performed.

A mixture of mag. sulph. 8 oz., soda sulph. 4 oz., ammon. carb. 1½ oz. and chlorodyne 1½ oz. in 3 pints of water was pumped in, with the hope that its action would serve to dissolve any mechanical obstruction or lubricate it for the resultant stimulation.

Outcome.—Death during the night.

Post-mortem.—There were no external features of interest. In the abdominal cavity there was found a large accumulation of greenish fluid, with commencing peritonitis. The stomach was moderately full of similar fluid and contained many bots. The factors of importance were: (1) About six feet from the pylorus the ileum showed a two-inch band of constriction, and a mass of tissue consisting of several abscesses full of greenish pus at the side where the mesentery was attached; (2) a strong band of adhesion between this and another loop of ileum; (3) strangulation of a loop of about two feet of small intestine through a small hole in this adhesion band.

Discussion.—It was assumed that the lesions found wholly originated from a piece of wire or other foreign body. It is felt that seldom is a sequence of events so clearly shown by both history and *post-mortem* findings.

THE POISONS BOARD 1936-39

It will be recalled that the Poisons Board was set up in 1933 to hold office for a term of three years, as laid down in the second schedule to the Act. The term of office expired in November last, and with one exception the members of the Board have been reappointed by the respective official bodies. The exception is the member appointed by the Ministry of Agriculture and Fisheries, Mr. C. Nathan, Assistant Secretary to the Ministry, taking the place of Mr. H. G. Richardson. Sir Gerald Bellhouse, C.B.E., remains Chairman of the Board and Mr. M. D. Perrins Secretary.

Abstracts

[The Pathology of "Sway-back"—A Congenital Demyelinating Disease of Lambs with Affinities to Schilder's Encephalitis. Innes, J. R. M. (1934-35.) Inst. Anim. Path. Camb. 4. 227-250.]

This paper describes a detailed investigation into the disease known as "sway-back" affecting the nervous system of new-born and young lambs which occurs in England and Wales and also in certain other countries. The incidence of the disease shows considerable variations in affected flocks from year to year.

The author has made a detailed examination of 32 affected animals received from several outbreaks. In all cases a complete macroscopic and microscopic examination of the central nervous system was carried out, and in some cases this was supplemented by bacteriological, chemical and haematological studies.

Affected animals show a spastic paralysis, particularly of the hind limbs and incoordination of movement, while some of the more severely affected animals show blindness which is probably central in origin. The disease runs a progressive course unassociated with fever. Under natural conditions many of the affected animals rapidly succumb to intercurrent infections but in any case, the disease usually ends, ultimately, in death.

The characteristic lesion is a diffuse symmetrical demyelination of the cerebral white matter which is very varied in extent. In the more severe cases the changes are evident to the unaided eye, the degenerated white matter being replaced by a gelatinous substance or by fluid contained within cavities. Histologically, there is a proliferation of neuroglia in the degenerated areas and in the walls of the cavities. Secondary degeneration of the motor tracts is always present and can be traced to the lower levels of the spinal cord.

The condition is not confined to any particular breed; moreover, no evidence was obtained that bacteria, viruses or deficiency factors play any part in its causation. It is suggested that the clinical and pathological features show a marked similarity to the condition known as Schilder's disease in man.

In considering the aetiology of the disease, the author postulates the existence of some toxic substance which is carried by the ewe during pregnancy and perhaps shortly after birth. This agent produces no pathogenic effect on the ewe but passes through the placenta and exerts a specific effect on the myelin within the cerebrum of the foetus, either destroying it or possibly inhibiting the myelination of tracts which normally would subsequently undergo this process. The possibility that this toxic substance is lead, is discussed, but the

author expresses the opinion that it is difficult to reconcile this view with the conditions under which the disease occurs in this country.

E. G. W.

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[Different Methods of Infecting Sheep Experimentally with Br. melitensis. Taylor, R. M., and Jorgensen, J. J. (1936.) *Rec. Méd. vét.* **112.** 3. 140-152.]

Owing to the high incidence of human undulant fever in southern France the subject of Brucella infection of sheep is one of great importance since these animals form the natural reservoir of infection. The authors have studied various artificial methods of infecting sheep with a view to ascertaining the normal natural route of infection. The normal route of infection in various animal species is a vital factor from the point of view of control. It is well known that the normal route varies; thus, in cattle, the oral route has for long been regarded as the normal portal of entry, although it is known that infection can be artificially produced *via* the skin and that the conjunctival route is a sensitive one; in pigs, on the other hand, genital infection from boars having active testicular infections commonly occurs.

Sheep used for the investigation were obtained from a district where ovine Brucellosis was not endemic, whilst according to serological and allergic tests they were free from infection. Seven sheep were treated, with the following results:—

(1) A swab soaked in Brucella culture was affixed to an artificially scarified area and retained in place for 48 hours. Infection resulted.

(2) A paste of faeces contaminated with culture was spread on an artificial abrasion. Infection resulted.

(3) Similar material was applied to the interdigital space. Infection resulted.

(4 and 5) Culture was introduced directly into the stomach by tubes. Animals gave doubtful reactions after the second administration.

(6) Drinking water was contaminated with culture. Infection resulted.

(7) Swabs soaked in culture were introduced into the nostrils and rapidly withdrawn. Infection resulted.

To test for the onset of infection agglutination and complement-fixation tests and blood cultures (using 10 c.c. of venous blood) were carried out at weekly intervals. An allergic test was made about five weeks after administration of the test dose.

[The number of animals used is too small for definite conclusions to be drawn; nevertheless, these experiments give very interesting indications. Apparently heavy doses of Brucella can be destroyed by the gastric juices; this suggests that oral infection means infection *via* the buccal and not the intestinal mucosa. Infected drinking water might be a possible exception as the organisms in this case would pass rapidly through the stomach, whilst there would be a concomitant dilution of the gastric juice. The positive result of intranasal instillation supports the above view.

The positive results following the artificial contamination of skin abrasions are interesting, but it is difficult to compare such findings with the natural contamination of naturally acquired abrasions. It is fairly certain that under field conditions lesions would be contaminated by far fewer organisms, but they would probably have greater invasive ability than laboratory cultures.]

E. J. P.

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[Retention of the Afterbirth in Cattle. I.—Therapy; II.—Aetiology; III.—Clinical and Therapeutic Observations. Liebsch, E. (1936.) *Arch. wiss. prakt. Tierheilk.* **71.** 1. (6 tables, numerous refs.)]

The author reviews at some length the different methods which have been suggested for the successful treatment of retention of the afterbirth in cows and records his experience with 203 cows which he has had occasion to treat during the past five years.

He considers that retention of the afterbirth may take place after a difficult or prolonged parturition as a result of failure of the uterine contractions. It may also be caused by a placentitis produced, for example, by *Br. abortus*, but it is more usually sporadic and often no bacterial or pathological lesion can be found to explain its occurrence.

Since the aetiology of the condition cannot be explained satisfactorily, the manual removal of the afterbirth appears to be the only rational treatment which can be adopted. Disinfectants can exercise little beneficial effect when the uterus contains much putrid material as is so often the case in cows, and continual handling of the uterus is contra-indicated in many cases. When the afterbirth is removed by hand care must be taken that all dead tissue comes away.

J. A. N.

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[Rupture of the Diaphragm in the Dog. McKinna, W. R. (1936.) *Vet. J.* **92.** 10. 371-372.]

The author records a case of diaphragmatic hernia in a five-year-old fox-terrier dog which had previously been involved in a motor accident.

The case is of interest in that symptoms of any real significance were not exhibited until six months after the accident, and on opening the chest cavity respiratory failure did not occur until 15 minutes had elapsed.

C. F.

Reports

ARMY VETERINARY SERVICE IN INDIA

ANNUAL ADMINISTRATION REPORT FOR 1935-36*

During the year 71 officers were employed, including eleven Indian commissioned officers. These latter have been confirmed in their appointments, after passing their retention examination. There were 126 veterinary assistant surgeons.

The average animal strength was 74,767, consisting of 32,295 horses, 27,938 mules, 3,837 camels, 10,554 cattle and 143 donkeys. The general condition of the animals was good. There was a reduction in the admissions for colic, which is a great improvement on past years—due, it is stated, to more effective rationing. A considerable number of cases of paraplegia occurred and some of these might have been sporadic cases of encephalomyelitis. One outbreak of the latter disease involved 18 cases. It is confessed that there is some confusion in regard to these diseases and the method of infection and transmission is obscure. Investigation is being conducted.

There were four cases of glanders. Outbreaks of foot-and-mouth disease occurred in the animals belonging to the Military Farms Department but were dealt with effectively. Equine influenza was inconsiderable compared with the previous year, when there was a serious outbreak. The methods of controlling this disease are detailed in the report.

Anti-rinderpest inoculation with goat virus was successfully instituted.

As usual, strangles was rife among the young stock at the Remount Depôts, but the mortality was small. This disease is responsible for considerable losses, as a rule. Investigations in preventive treatment are being continued in collaboration with the Muktesar Institute.

Owing to the great advance made in recent years in the diagnosis and treatment of surra, this disease is not so serious as in the past. There were 478 cases with eleven deaths. Most of the cases occurred in camels which, under the ordinary conditions of maintenance, are difficult to control.

In the Horse Breeding Areas 410 stallions and 13,060 mares and young stock were maintained. In these, 192 cases of joint-ill were reported, with 19 deaths.

Two thousand, one hundred and nineteen Australian remounts were examined at Calcutta and Bombay, of which 162 were rejected.

The report is concise and informative.

G. K. W.

*Simla, Government of India Press.

NIGERIA

REPORT OF THE VETERINARY DEPARTMENT, 1935

The first part of this report deals with the efforts which are being made to assist the economic development of the animal industry in general. The Chief Veterinary Officer appears to think that some justification is necessary for the activities of his staff in this direction. He points out, however, and quite rightly, that simply to preserve animals and increase their numbers, and to do nothing more, is impossible. In another section of the report he again draws attention to the fact that this work is only of secondary importance. Surely it is the logical sequel to disease control, and, without it, true progress could not be made. Both branches of effort are of equal importance.

The details supplied emphasise the worth of the efforts on the economic side. The value of the hides and skins exported during the year totals £773,806. This covers no less than 5,000,000 goat skins, 786,000 sheep skins and 800,0000 cattle hides and gives some idea of the stock population of Nigeria. The steadily increasing export is due to the improved quality of the skins, resulting from the instruction imparted in preparation and treatment. Departmental efforts are detailed in connection with the meat, ghee and fresh milk trade and in measures for the prevention of cruelty to animals.

Work at the Veterinary School has been maintained and 44 native pupils passed out during the period under review.

The policy of the department is to control disease by means of large-scale immunisation and the results are considered to be satisfactory. A total of 1,173,036 inoculations was carried out during the year. Excluding 14 research officers, the total European staff, professional and lay, is stated to be 22. The amount of day-to-day drudgery, in carrying out inoculations upon such a scale, can be imagined. Blackquarter, pleuropneumonia, haemorrhagic septicaemia, anthrax, foot-and-mouth disease and trypanosomiasis are among the diseases dealt with, but only in connection with the last-named is the loss serious.

The preparation of vaccines has been the only work of importance carried out at the laboratory. It is stated that the Pathologist was absent for a considerable portion of the year on leave and on temporary duty in Gambia. The Research Officer and Assistant Pathologist were either on field or administrative duties during the whole year. Thus, the laboratory team was entirely broken up because the staff was required for duties other than those upon which they should be engaged. Only serious insufficiency of staff can be responsible for such a policy

—and yet the writer has failed to find in the report any mention of the necessity for increase.

J. S.

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STAFFORDSHIRE

REPORT OF THE CHIEF VETERINARY OFFICER, 1935

The Annual Report by the Chief Veterinary Officer, Mr. F. A. Davidson, covers the first complete year of work carried out by the Staffordshire veterinary staff. The staff, now consisting of one Chief Veterinary Officer and seven assistants, commenced routine inspection of dairy herds in October, 1934, and during the year 1935 7,645 routine herd examinations, covering 137,334 cows, were carried out. The county is divided into convenient areas, each of which is under the supervision of an assistant veterinary officer, and the report gives a summary of the herds in each sanitary district of the county. The number of tubercle-infected samples of milk produced in Staffordshire and reported to the veterinary staff under Section 4 of the Milk and Dairies (Consolidation) Act, 1915, was 231 as compared with 245 in the previous year. In this connection 212 herds, consisting of 5,180 milking and dry cows, were examined and 176 cows were dealt with under the Tuberculosis Order—of this number, 159 were affected with tuberculosis of the udder. Mr. Davidson makes a very important statement when he says, "A cow which is only slightly suspicious as a possible source of infection in milk can often be diagnosed clinically, or from sputum, as suffering from pulmonary tuberculosis, the *post-mortem* examination later showing either definite tuberculous mastitis or extensive tuberculosis of the peritoneum and abdominal viscera and lymphatic system with probably microscopic tubercles in the mammary tissue."

The number of grade "A" (now "accredited") herds in the county had risen by the end of the year to 1,633 as compared with 77 at the end of the previous year. The veterinary staff took over the sampling of milk for bacterial count and from July to the end of the year 1,327 samples were taken—of which 77 per cent. complied with the standard laid down, and 23 per cent. failed to do so. Advice on clean milk production was also given to producers by the county veterinary officers. The report stresses the importance of buildings properly constructed on a hygienic basis as an aid not only to clean milk production but also to the maintenance of the health of dairy herds and to reduction in labour involved.

The number of producers of "certified" and grade "A" (T.T.) milk at the end of the year was ten, and the Chief Veterinary Officer points out that in a county such as Staffordshire, where very little rearing of young stock is carried on, this small percentage of tested herds is only what one would expect. Mr. Davidson indicates in a concise résumé the main lines on which the establishment of tubercle-free herds should proceed.

The purity of milk supplied to schools under the Milk in Schools Scheme is supervised by the county veterinary staff and herds supplying milk to schools are examined approximately once each quarter. Eighteen cows which were possible sources of tuberculosis in the milk supplied to schools were slaughtered under the Tuberculosis Order. Milk supplies to sanatoria were also kept under veterinary supervision in similar manner to that supplied to schools.

Under the Tuberculosis Order of 1925, 1,733 animals were slaughtered during the year—of which 724 were affected with tuberculosis of the udder or were giving tuberculous milk, 246 were suffering from tuberculous emaciation, and 751 were suffering from chronic tuberculous cough, while 12 animals slaughtered under the Order were found on *post-mortem* examination to be free from tuberculosis. Of the 1,721 animals which were found to be tuberculous on *post-mortem* examination, 916 were affected with advanced tuberculosis, while the remaining 805 were not-advanced cases. Total compensation paid to owners amounted to £8,367 1s. 3d., and the total salvage received on the sale of carcases amounted to £2,727 6s. 3d. Of the 1,733 cows slaughtered under the Order, 790 were reported by owners, etc., leaving 943 animals which were presumably detected by the county veterinary officers in the course of their examinations. The Chief Veterinary Officer estimates that over 90 per cent. of tuberculous udders found during any year are traceable to tuberculous milk fed to calves over three years previously, the disease being implanted in the calves from feeding on tuberculous milk and exhibiting itself in the form of tuberculosis of the udder when these calves, as mature heifers and cows, commence lactation.

The microscopical examination of samples of milk, sputum, etc., taken by the county veterinary officers in the course of their examination of dairy herds is carried out by the Bacteriologist in the County Laboratory. In this respect, the Staffordshire Veterinary Department differs from many County Veterinary Departments, in the majority of which all microscopical examinations are carried out personally by the county veterinary officers.

The report includes notes of other diseases of dairy herds found in the course of routine veterinary examination. Mastitis, abortion and Johne's disease are stated to be very prevalent in the county and Mr. Davidson stresses the need for stock owners to make greater use of the skilled services of the profession in com-

N.V.M.A. Divisional Reports

MID-WEST VETERINARY MEDICAL ASSOCIATION*

OPERATIONS AND DEMONSTRATIONS AT TROWBRIDGE

A meeting of the Mid-West Division of the N.V.M.A. was held at Trowbridge on October 9th, by kind invitation of the President, C. R. Golledge, Esq., when the following members and visitors were present: *Members*—Messrs. C. S. Adams, W. A. Austin, Esmond Brown, S. V. Golledge, H. C. Wilkins, J. C. S. Powell, C. J. Pugh, C. R. Golledge, G. E. Henson, F. B. Hardy, W. Webster, J. H. Stewart, W. D. Rees, P. R. Leckie, E. C. Bovett, J. R. Hewer, L. A. Forker, S. H. Pettifer, T. J. Margarson, G. S. Bruce, A. E. Gachet, R. Moore, W. A. Austin, J. R. Barker, A. J. Baxter and C. E. Perry; *Visitors*—Messrs. C. Masson, H. B. Kauntze, L. W. Bovett, T. H. R. Irwin, J. Cochrane-Dyet, J. Richardson, W. H. Simpson, A. G. McCrea, G. G. McLaren, R. Hudson, H. S. Caldwell, W. H. Chase, C. F. Parsons, G. F. Banham, L. G. Anderson, V. E. Perry, A. C. Fraser, W. Caulfield Smith and R. H. Penhale.

Apologies for absence were received from Professor Sir Frederick Hobday, Professor J. Share-Jones and Mr. J. C. Coleman.

The meeting took the form of a series of operations and demonstrations, which were carried out, under ideal conditions, in a field adjoining Mr. Golledge's house. These took place in the following order:—

(1) Chloroforming standing and castration of colt, by W. R. Watson, Esq., M.R.C.V.S., Thornbury.

(2) Castration of colt standing under local (cocaine) anaesthesia, by R. Hudson, Esq., F.R.C.V.S., Retford, Notts.

(3) Operation for the reduction of umbilical hernia, by R. Hudson, Esq., F.R.C.V.S.

(4) Demonstration of epidural anaesthesia in the cow, by the President (C. R. Golledge, Esq., M.R.C.V.S.).

*Received for publication November 29th, 1936.

Chloroforming Standing and Castration of Colt

In describing the above, Mr. Watson writes: "In connection with the chloroforming, I enclose photos of the muzzle used, which I had made to my own specifications 16 years ago, after I had received a bad injury when doing a colt 'standing.'

"With this muzzle, the only thing necessary is to be certain to exclude air except through the opening at the bottom, which opens and closes by means of a zip fastener. The exclusion of air at the top is ensured by stuffing tow in between the jaws and fastening the strap tightly round the face below the eyes.

"The amount of chloroform required is 2 oz. for a full-grown horse and down to 1¼ oz. for a one-year-old colt. I prefer tow to cotton-wool on which to give the chloroform. I lunge the colt in a circle before giving the chloroform, as it is essential to have him breathing fast so as to get him down quickly.

bating these diseases. It is evident, however, from this report that systematic examination of herds is doing much to encourage farmers to keep younger cattle of a higher standard of health and quality than was previously the case, and in an intensively dairying county such as Staffordshire, where the amount of rearing is very small, the problem of cleaning up dairy herds is not an easy one. Mr. Davidson and his staff are to be congratulated on the excellent pioneer work which they are doing and which in course of time will, as this report indicates, bear fruit worthy of all the expense and trouble entailed.

"I get three men to hang on to the rope and am particular to have them all on the same side. When the colt is down, have the top hind leg pulled up to the belly, or rather the ribs, by a rope round the fetlock passed underneath the neck and back to the fetlock again and pulled up tightly.

"I use tinct. iodi 1 part, spirit 3 parts, to disinfect the scrotum and thighs.

"Remove the testicles by emasculator or écraseur.

"The two horses I did at Trowbridge went down on the wrong side, but that did not inconvenience me. Some practitioners prefer them to be on the left side so that they work with the right hand. It is easy enough to pull them over after they are down.

"By the above-mentioned method I, at one time, did seven colts in one-and-three-quarter hours at one farm, and I have done all ages up to 16 years, including a five-year-old Shire.

"Certainly by the chloroforming method there is the minimum of pain. Also, to my mind, it is more professional and, moreover, it is a method that can only be used by qualified men."

Castration of Colt Standing, under Local (Cocaine) Anaesthesia

The subject of Mr. Richard Hudson's first operation was a three-year-old hunter-bred colt, and the operation was performed in the corner of the paddock.

An attempt was made to strap up a fore-leg, but this was resisted, so only a twitch was applied.

An injection of 8 c.c. of 5 per cent. solution of cocaine was made into each testicle, the needle penetrating the rear of the testicle and passing upwards into the epididymis. The needle was 2¼ in. long and 14 gauge in diameter and very little pain was evinced on its insertion.

Waiting a few minutes for anaesthesia to take place, the incision was made into the scrotum of the near side. It was found that the testicle was adherent and needed separation with the fingers before it could be removed. Having freed it, the two portions of the cord were divided and separately crushed with the emasculator.

Similarly, the other testicle was found to be adherent and required the breakdown of its attachments to the tunica vaginalis before it could be removed. The wounds were swabbed out with carbolic solution and dressed with antiseptic oil: creolin, 1; rape oil, 7.

The case was a good one for showing the advantages of local anaesthesia, for it is doubtful if the adhesions could have been broken down without it while in the standing position.

Operation for the Reduction of Umbilical Hernia

The subject of Mr. Hudson's second operation was a yearling half-bred filly.

The hernia formed an elongated sac, about four-and-a-half inches long by three inches in diameter, and the abdominal opening was about one-and-a-quarter inches in diameter. The sac was large for so small an opening.

The abdominal opening was considered too small to attempt a radical or semi-radical operation, and the operation was performed with crossed wires and ligature. The wires or skewers were of 16 g. steel-plated wire, ringed at one end, and the ligature ordinary thin cotton lace. The animal was cast with sidelines and given 1 oz. of chloroform.

The sac was shaved and dressed with tinct. iodi, gripped with forceps at its extremity and drawn taut, then manipulated to return any contents into the abdomen and to find the centre of the peritoneal sac. Gathering up the skin and the peritoneum between the thumb and finger, a wire was pushed through and a second one at right-angles on the same level. While the sac was still being drawn taut by an assistant the ligature was placed above the needle and drawn tight. Two ligatures were applied, each taking several turns, and painted with tinct. iodi —the latter to be applied again every two or three days. The ends of the needles were cut off about half-an-inch from the ligatures.

The following points concerning the foregoing procedure were noted: (1) That this old method was simple and the best for small herniae with round openings; (2) that shaving and iodine lessened the risk of tetanus; (3) that central penetration of the peritoneal sac gave a better closure; (4) that needles must be sharp and smooth to reduce pain in penetration—thus, if anaesthesia is imperfect, the risk of struggling and forcing the bowel into the sac while needles are in position is reduced, and (5) that cutting off the free ends is safe and not attended by the risk of the needles working out.

[Mr. Golledge reports, later, that all the colts operated on are progressing favourably.]

Epidural Anaesthesia in the Cow

The President (Mr. C. R. Golledge) furnishes the following notes concerning this demonstration:—

This form of anaesthesia is so useful in cattle practice that, in spite of several similar demonstrations having been given in recent months, a repetition seemed justifiable.

The skin over the site of injection, situated between the spinous processes of the vertebrae forming either the sacro-coccygeal or first coccygeal joint, should be thoroughly cleansed. Owing to its scaly nature it is advisable, after having clipped off the hair, to scrape the surface with the scissor blade before disinfecting, for which purpose 5 per cent. carbolic acid has proved satisfactory.

While making the injection the animal should

be "nosed" and, if possible, the tail restrained and slightly raised by an assistant.

The needle is inserted in the middle line in the slight depression between the spinous processes of the joint chosen at a point about two-thirds of the distance back from the anterior spine. It is pushed through the skin and underlying tissues in a forward and downward direction for about one-and-a-quarter inches, when it will come in contact with the floor of the epidural space. The syringe containing the anaesthetic is then attached and the injection made. It is an advantage if the plunger of the syringe used (10 c.c. Record) works easily, since if resistance to injection is noticed it will then indicate that either the needle is blocked or, what is more likely, it has not been inserted into the epidural space. Should the latter be the case it is invariably due to the needle not having been directed sufficiently forward or having deviated from the middle line.

Special needles are manufactured for the purpose but are not essential, the one used for this demonstration being an ordinary hypodermic needle 1½ in. long with a diameter of 1 mm.

Anaesthesia by this method in cattle is advocated chiefly to prevent straining in cases of prolapse or dystokia, operations in the region of the perineum, and in the bull for operations on the penis. For these purposes an injection of from 12 to 14 c.c. of 2 per cent. procain is sufficient unless the animal is exceptionally large.

Following injection it is preferable to stand the animal on sloping ground with the head downhill so that the anaesthetic can gravitate forwards. Maximum effect is noticed in from 15 to 20 minutes, when complete paralysis of the tail and weakness of the hind legs is evident. The animal may need support if it is required to remain standing while the operation is completed.

Larger injections of anaesthetic, although extending the scope for operating, have the disadvantage of putting the animal down and keeping it in the recumbent position for some time, during which it may make unsuccessful attempts to rise and so injure itself. Although such a risk is not great, it is likely to cause the owner of the animal some anxiety. Providing that the injection is carried out with every aseptic precaution one need have no fear of any other unfortunate sequel.

The members and friends were afterwards entertained to tea by the President. A hearty vote of thanks to the operators was proposed by Mr. J. R. Barker, and Messrs. Hudson and Golledge suitably responded.

A similar tribute was accorded the President for entertaining the members, on the proposition of the Hon. Secretary, who said that Mr. Golledge had made all the arrangements for the meeting and so relieved him of his work.

Charles E. Perry, *Hon. Secretary.*

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MIDLAND COUNTIES VETERINARY MEDICAL ASSOCIATION*

MEETING AT THE HARPER-ADAMS AGRICULTURAL COLLEGE

The quarterly meeting of the Midland Counties Veterinary Medical Association was held on Wednesday, September 30th, 1936, by invitation, at the Harper-Adams Agricultural College, Newport (Salop). The President, Mr. W. F. Aston, was in the chair, and the following members were also present: Colonel Marriott, Messrs. James Martin, L. C. Tipper, S. Jennings, O. V. Gunning, W. B. Thompson, E. O'Neill, H. W. Griffiths, E. Gray, A. B. Fewings, C. J. Clifford, S. M. Woodward, A. A. Forsyth, A. B. Forsyth, J. Martin, junr., T. B. Yarrow, G. S. Muir, L. W. Heelis, J. E. Hutchinson, J. D. Downham, B. DeVine, D. J. Anthony, W. Trigger, F. Chambers and the Hon. Secretary (Mr. H. W. Dawes).

The visitors present included Mrs. K. G. B. Kelly, Messrs. T. G. Shaw, A. C. Campbell, H. B. Tilley, T. Dalling, A. D. M. Laing, A. Nolan, A. C. Howse and F. J. Dudley.

Nominations.—The minutes of the previous meeting having been read and confirmed, the President asked for nominations for membership of the Association. Mr. DeVine proposed Mr. Manley, of Stoke-on-Trent, and the Hon. Secretary proposed Mr. A. D. M. Laing, of Stourbridge. These two gentlemen will come up for election at the next meeting.

Royal Sanitary Institute.—The Hon. Secretary said that he had received invitations to a sessional meeting of the Royal Sanitary Institute, at the Town Hall, Loughborough, on October 23rd and 24th, and if any members were prepared to attend, he would be glad to give them tickets and all information. Mr. DeVine suggested that members living in or near Loughborough might be deputed to represent the Association officially, and the Hon. Secretary said he would see what he could do in that matter.

Council's Report.—The Hon. Secretary presented the report of the Council, which met earlier in the afternoon.

The Council recommended that Mitchell's Tooth Forceps be purchased and added to the instruments in the possession of the Association for the use of members, and, further, that the Hon. Secretary be empowered to spend what was necessary on the repair of the boxes used for sending the instruments.

*Received for publication December 7th, 1936.

The Hon. Secretary observed that these instruments were in such great demand that they were lent to members sometimes as often as two and three times a week.

The Council also recommended that the next quarterly meeting be held at Birmingham on Friday, November 27th, and that Mr. C. G. Allen, of the City of Birmingham Veterinary Department, be invited to give a demonstration of the methods of meat inspection.

The Council's report was adopted.

The Late Professor Macqueen.—The Hon. Secretary referred to the loss which the veterinary profession had sustained by the death of Professor Macqueen, which had occurred since their last quarterly meeting. This Association had also lost one of its oldest Honorary Associates, and one who had often taken a leading part in their discussions. He saw to it that the Association was represented at the funeral, and he had also sent a message of sympathy, in the name of all the members, to Professor Macqueen's daughter.

The President said they were very much indebted to the Hon. Secretary for the steps he had taken in the matter, and at his request those present stood for a minute in tribute to Professor Macqueen's memory.

Illness of Mr. R. Palmer.—The President also referred to the illness of Mr. R. Palmer, of Warwick, an old and respected member of the Association, and suggested that the Hon. Secretary be requested to convey to Mr. Palmer the best wishes of the Association for his safe recovery. The Hon. Secretary said that he would gladly undertake that duty.

Nutrition and Health

Dr. Charles Crowther, Principal of the Harper-Adams College, delivered a short address on "The Bearing of Nutrition upon the Health of Livestock," and he began by welcoming the Association to Newport. "We regard it," he said, "as not merely a pleasure, but a privilege to have you here, because not only have we a very direct interest in your work through our own Veterinary Department, but we also consider you as being very closely linked to us in our great work of agricultural education. Through your intimate contact with farmers you can do a great deal to help in disseminating knowledge, and in influencing them as to the necessity of a theoretical knowledge to supplement the old-fashioned practical training. Our whole aim in our veterinary work at this College is to supplement what you are doing and to assist you through the facilities we have here. We can help you not merely through the laboratory, but in other ways, and we shall be delighted to do so if you choose to share any of your difficulties with us."

Circumstances, continued Dr. Crowther, had made it impossible for him to prepare anything in the nature of a formal address. It so happened, however, that he had just been engaged in investigating the relation of feeding to health in livestock, and the result would appear in an article he had written for the next issue of the *Journal of the Royal Agricultural Society of England*. After a few preliminary observations he proposed reading this article to the meeting.

That a good deal of disease was associated with nutrition had long been known to the veterinary profession. His own branch of agricultural science had been slower in realising that connection and had been inclined to think of nutrition as being a self-contained field of research. They had now been driven to the conclusion that nutrition could not be studied by itself, or without reference to its relationship to the general health of the animal. Up to 30 years ago, they used to teach, in regard to the make-up of a ration, that provided it was palatable and supplied the animal with a sufficient amount of energy it was satisfactory. It was thought, for instance, to be very unlikely that mineral shortage would cause trouble, but the fact was overlooked that livestock husbandry was rapidly changing. Mineral shortage was found to be retarding growth, and then arose the problem of the right minerals and the right proportions. In short, the whole problem of nutrition was vastly more complicated than it was 30 years ago, and it called for the most careful study.

Dr. Crowther then proceeded to read what he had written for the *Journal of the Royal Agricultural Society*, to be published shortly.

The President said it was a matter for regret that time would not permit of a discussion of this most interesting topic. No one was better qualified to speak on it than Dr. Crowther, whose considered opinion would be read with interest when it was published.

On the motion of Mr. Fewings a vote of thanks was accorded to Dr. Crowther for his address.

Diseases of Poultry

The company then moved off to another part of the College to see the work being done by the National Institute of Poultry Husbandry. This, it was explained, was part of a wider scheme which was subsidised by the Ministry of Agriculture.

Mr. K. D. Downham, the Chief Veterinary Officer at the College, acted as guide and gave demonstrations of blood tests. Returning to the main building, Mr. Downham delivered an address on the diseases of poultry, illustrated by a number of interesting lantern slides.

Mr. K. D. Downham opened his address by

drawing attention to the fact that avian tuberculosis was of increasing importance to the veterinary profession on account of the fact that the association of cattle with tuberculous fowls rendered the former sensitive to the tuberculin test. Three cases were cited in which cattle had given positive reactions to tuberculin following contact with fowls affected with tuberculosis. The incidence of avian tuberculosis in pigs also showed that tuberculosis in fowls was of great importance to the pig industry, it having been shown that approximately one-third of the tuberculosis in these animals was of the avian type.

In the establishment and maintenance of tubercle-free herds consideration had to be given to the prevalence of avian tuberculosis, and on such farms it was advisable to test pigs with both avian and bovine tuberculin to ensure that these animals were free from either form of the disease; poultry should not be allowed to use pastures or premises which were also used by tubercle-free cattle.

Lantern slides illustrating avian tuberculosis and diseases in fowls which, from their *post-mortem* appearances might be mistaken for it, were exhibited. These included nodular disease of the intestines due to the tapeworm *Raillietina echinobothridia* and blackhead lesions caused by *Histomonas meleagridis* affecting the liver of turkeys. Reference was made to a type of chronic coccidiosis in fowls which produced emaciation with caseous lesions throughout the whole length of the intestines: the macroscopical appearance of these lesions was practically identical with that of avian tuberculosis affecting the intestines of the fowl; *Eimeria mitis* was found to be the species responsible for this type of coccidiosis.

These conditions in fowls showed how very necessary it was to examine stained smears from these lesions microscopically for the presence of tubercle bacilli and, also, to examine for coccidia and parasites.

Lantern slides illustrating the various *post-mortem* appearances of several types of coccidiosis in fowls were then shown; these included acute coccidiosis of the caeca caused by *Eimeria tenella*; ulceration of the intestines due to *Eimeria mitis*, and reproductions of the eyes of fowls affected with chronic coccidiosis due to *Eimeria necatrix*.

A slide showing coccidiosis affecting the kidneys of a pullet was of particular interest because it was the first record of this disease causing lesions in these organs in chickens. Microphotographs had been taken of the coccidia present in the lesions and Mr. Downham hopes to report the case in detail in the near future.

The characteristic *post-mortem* appearances and methods of diagnosis of coccidiosis in chickens were described, with particulars of the technique involved. The various methods of controlling the disease by prevention of contact with the droppings by the use of movable rearers and folding units were enumerated, and the necessity of keeping young birds upon clean ground was emphasised.

A number of lantern slides showing tumours in various organs was shown; these were followed by illustrations of the liver, spleen and kidneys in cases of leukaemia and lymphomata of the heart and visceral organs.

Illustrations of diseases of the circulatory system included pericarditis with effusion, haemangioma and bleeding cysts.

Lantern slides illustrating abnormalities of the reproductive organs included multiple cysts of the ovary, enormous accumulations of egg material in the oviduct, and ovarian tumours. A short description of these conditions accompanied the presentation of the slides.

Following the reproductions of abnormalities and diseases affecting the kidneys, an account of the causes of visceral gout in chickens was given; exposure to cold and sudden severe changes of temperature had been shown to be responsible for this condition in very many cases.

The address concluded with an account of blackhead in turkeys, reference being made to experiments carried out by the speaker, in which it had been shown that many arsenical preparations were of great value in the treatment of this disease. Mr. Downham emphasised the fact that it was necessary to remove the treated birds on to ground which had not previously been used for turkeys or fowls, and that if birds had to remain upon the same ground it was necessary to repeat the treatment at intervals of not more than ten days.

Demonstrations upon Poultry.—Immediately before the above address Mr. K. D. Downham demonstrated the methods of conducting intravenous injections upon turkeys and discussed with the members the treatment of blackhead by means of various preparations. The technique of withdrawing blood samples from fowls for the purpose of agglutination testing for the presence of pullorum disease (B.W.D.) was also shown. These demonstrations were carried out at the National Institute of Poultry Husbandry.

Vote of Thanks.—Mr. Frank Chambers voiced the thanks of the meeting to Mr. Downham for his address, and said those who saw him demonstrate at Scarborough must have been prepared for the masterly way in which he had handled the subject that day. They had spent an interesting and instructive hour under Mr. Downham's direction.

Members had tea together before separating.

H. W. Dawes, *Hon. Secretary.*

ROYAL COLLEGE OF VETERINARY SURGEONS

Membership Examinations, December, 1936

LIST OF SUCCESSFUL CANDIDATES

(*Continued from page* 1530).

Glasgow (cont.)

FIVE YEARS' COURSE

SECOND YEAR.

Black, T. M.
Burton, Miss I. W.
Crerar, Wm.
Dunlop, F. (P)
Ferguson, Miss J. R.
Hempstead, F. J. D.
Holmes, Edward
McCorkindale, J.
MacLellan, Malcolm
Macleod, Donald
Macleod, F. P.
Mactaggart, A.
Melville, A. V.
Parker, Miss E. R.
Pearson, D. J.
Rose, W. K.
Scott, W. A. C.
Tulloch, J. A. R.
Wardrop, A. G.

(P) Denotes credit in Physiology and Biochemistry.

Animal Management

Armstrong, D. H.
Boyce, D.
Brownlee, W. A. D.
Campbell, J. I.
Dunlop, F. (credit)
Farrell, A. V.
Ferguson, Miss J. R.
Flynn, A. S.
Hempstead, F. J. D.
Holmes, Edward
MacLellan, Malcolm
Ogg, J. S.
Parker, Miss E. R. (credit)
Pearson, D. J.
Rose, W. K.
Wardrop, A. G.
Wight, J. A.

THIRD YEAR.

Angus, D. B.
Bain, J. S.
Fraser, A. K. (H)
Galloway, J. D.
Hepburn, J. R. B
MacCallum, A. M.
McIntyre, Donald
Merry, A. O.
Shaw, Alex.
Smith, R. J. (H)
Stevenson, Miss M. C. (H)
Turner, H. F.
*Wyse, Geo.

* Denotes Second Class Honours.
(H) Denotes credit in Veterinary Hygiene, etc.

FOURTH YEAR.

Fitzpatrick, M. J. (Paras)
Harrison, Thos.
Hunter, W. K.
Lockhart, D. M. (Paras)
Robertson, J. M.
Wilson, A. L.
Wilson, Andrew (Paras)

(Paras) Denotes credit in Parasitology.

FOUR YEARS' COURSE

Class C

Burrows, Wm.
Forrest, S.
MacAllister, D. I.
Marshall, James
Nisbet, Alister
Peters, Miss J. M.
Rolbag, E.
Thomson, R. H.

Edinburgh

FIVE YEARS' COURSE

FIRST YEAR.

Aitken, H. F. M.
Bamber, W. B. (C)
Barrie, N. M. (B)
Bax, R. E.
Bell, David
Birtwhistle, J. F.
Breckenridge, R. C.
Campbell, J. D.
Conn, Edwin
Couston, J. M. (C)
Davies, R. H. K.
Dunn, C. W.
Etoe, D. R. (B)
Fairweather, Alex.
Fletcher, W. E. (B)
Flodin, P. M.
Forbes, C. W.
Gordon, W. A. M. (B)
Hall, David (B)
Holmes, Graham
Johnson, J. E.
Lambert, A. L.
Littler, L. P.
McDougall, J. B.
McKenzie, H. H. H. S. (B)
Mackintosh, A. S.
Milne, F. J.
†Milne, W. M.
Morris, W. M. S.
Morrow, J. H.
Nelson, Daniel
O'Neil, J. A.
Orr, F. H.
Powley, G. S.
Rennie, J. D.
Robertson, A. I.
Robinson, Caulfield
Ross, James
Shaw, W. B.
Sinclair, D. F. (B)
Steele, H. B.
Storrar, D. (B)
Waugh, Robt.
*Wood, R. I.

† Denotes First Class Honours.
* Denotes Second Class Honours.
(C) Denotes credit in Chemistry and Physics.
(B) Denotes credit in Biology.

SECOND YEAR.

Abbott, J. B.
Anderson, W. R.
Britten, A. F. F. (P)
Davies, D. R. T.
Drummond, D. J.
*Evans, W. E.
Gray, J. A.
Hathorn, D. S.
Kershaw, G. F.
Shanks, Thomas
Smith, N. C.
Turner, A. L.

* Denotes Second Class Honours.
(P) Denotes credit in Physiology and Biochemistry.

Animal Management

Blackburn, P. S.
Britten, A. F. F. (credit)
Campbell, J. G.
Douglas, J. F.
Dow, J. K. D.
Drummond, D. J.
Eggeling, A. H.
*Evans, W. E.
Gray, J. A.
Hodgkins, R. A.
Kershaw, G. F.
Leitch, L. G.
Leitch, J. M. F.
Leslie, G. D.
McCrea, Robt.
McLaughlin, W. H.
Murray, E. G.
Phillips, James
Raises, M. B.
Randall, J. B.
Russell, G. H. H.
Shanks, Thomas (credit)
Turner, A. L. (credit)
Turner, J. R.
Twiss, A. F.
Young, Arch.

THIRD YEAR.

Blanshard, Wm.
Brown, Alex. (H)
Campbell, A. R.
Campbell, David (H)
Gibson, T. G. E.
Hood, D. M.
Jagger, Frank
Lawson, John
Luxmoore, H. B. (H)
Macrae, R. I.
Milne, A. H. (H)
*Newhouse, James
Owen, R. H.
Parker, Eric
Ross, K. A.
Stewart, J. A. C.
Taylor, Alex.
Watson, Robt.
White, D. G.
Wood, S. W.

* Denotes Second Class Honours.
(H) Denotes credit in Hygiene, etc.

FOURTH YEAR.

Byrne, F. A.
Grussell, C. S.
Leason, Arthur
Simison, J. T.

FOUR YEARS' COURSE

Class C

Johnston, W. J. G.
Macleod, A. M.
Macrae, Finlay
Sutherland, Arch.

Class D

Baker, William
Drummond, John
Elphick, T. B.
Fernie, Peter
Henderson, J. G. K.
Morris, L. T.
Ward, J. R.
Weir, A. W. A.

London

FIVE YEARS' COURSE

First Year.

Butcher, B. (C)
Clarke, E. V.
Crittal, D. P.
Fox, Miss W. E.
Gooch, R. H.
Harper, C. A. des N. (B)
Harrison, J. E.
Jones, O. G.
Jordan, F. T. W.
Kemp, Miss J. M. (B)
Matthews, A. C.
Moore, Miss D. M.
Murray, D. S.
Peters, E. G. E.
Pilgrim, E. G. (B)
Pringle, Miss J.
Russell, Miss A. F.
Russell, Miss A. M.
Scott, D. J. P.
Stainton, Miss S.
Ticehurst, R. E.
Wooldridge, R. L.

(C) Denotes credit in Chemistry and Physics.
(B) Denotes credit in Biology.

Second Year.

Blackler, P. M. B.
Douglas, S. W.
Gardner, J. C. A.
Gates, H. S.
Hughes, A. P.
Jagger, Miss K. M.
Lawfield, F. G.
Moon, G. J. H.
Patterson, J. R.
Regnauld, Miss L. A.
Reynolds, Miss J. F.
Richardson, D. A.
Stewart, Miss B. M.
Willett, D. N.

Animal Management

Blackler, P. M. B.
Dickson, S. J.
Hughes, A. P. (credit)
Makinson, J. B.
Packer, R. H.
Pass, N.
Regnauld, Miss L. A.
Steel, P. G.
Thomas, T. I.
Thomson, W. W.

Third Year.

Berger, J. (H)
Berry, A. G.
Biddis, K. J.
Bugg, R.
Bunker, J. A.
Butler, C. A.
*Davison, I.
Daybell, P. M.
Dean, P. W.
Edwards, F. V.
Foulston, W.
Fussell, Miss M. E.
Good, F. D. T. (A)
Littlewood, H. K.
Mead, N. St. C.
Pemsel, J. D. (A) (H)
Piercy, S. E.
Ridge, J. E. M.
Roberts, Miss D. M.
Soothill, P. L.
Spriggs, D. N.
Tunney, P. J.

* Denotes Second Class Honours.
(A) Denotes credit in Anatomy.
(H) Denotes credit in Hygiene.

Fourth Year.

Bishop, W. H.
Ellis, A. A. B.
Gwyer, R. G.
Hiles, H. J.
Howat, G. B.
Isherwood, A. D. A.
James, J. P. (Path) (Paras)
Lake, D. A.
MacOwan, K. D. S.
Roe, J. E. R.
Smith, F. W. A.
Spratling, R. F. (Path)
Walpole, R. O. W. (Paras)

(Path) Denotes credit in Pathology.
(Paras) Denotes credit in Parasitology.

FOUR YEARS' COURSE

Class B

Green, K. N.
Scott, C. E. S.

Class C

Camps, E. T.
Kirk, M.
Patten, Miss M. A. F.
Peyton, A. W.

Class D

Delavoye, Miss U. M. L.
Farman, Miss M. J.
Goodall, E. W.
Hart, A. W.
Kapur, J. D.
Kefford, R. W. K.
Pasfield, J. A.
Pollock, Miss S. M.
Rutter, T. E. G.
Watson, W. J. B.
Wright, R. A.

Liverpool

FIVE YEARS' COURSE

First Year.

Coulton, R. H. M.
Hughes, H. (B)
Lord, J. M.
Mitchell, P. J.
Protheroe, S.
Wilson, Miss B. H.

(B) Denotes credit in Biology.

Second Year.

Craig, N.
James, R. B.
John, H. M.
Jones, I.
Hornby, R. B.
Limont, A. G.
Morse, Miss M. D. R.
Ormrod, A. N.
Shaw, G. D.

Animal Management

Arthur, G. H.
Carr, W. H.
Davies, H. S.
Donnelly, J. F.
Jones, I.
Moss, J. A.
Smallwood, Miss E.
Sutton, D. O.
Willis, G. A.

Third Year.

*Cassar, A.
Docker, T. M.
*France, W. H.

* Denotes Second Class Honours.

Fourth Year.

Bonallo, T. G.
Kerruish, B. M.
Kieran, H.

FOUR YEARS' COURSE

Class D

Blackie, H. P.
Howse, A. C.
Needham, A. J. E.
Savage, M. de G.
Tattersall, Miss M. G.
Ward, J. F. C.
Young, S. C.

In Parliament

Prior to the rising of the House of Commons for the Christmas Recess the following questions and answers were recorded.

Sheep (Maggot-Fly)

Mr. Hall Caine *asked the Minister of Agriculture how many sheep in England and Wales were killed by maggot-fly during 1936; and whether any action is being taken by his Department to remedy this matter?

Mr. Ramsbotham: The condition caused by the attack of the sheep maggot-fly is not a notifiable disease, and no statistics are, therefore, available. My right hon. Friend is aware, however, that in the past few years sheep farmers have reported unusual activity of the parasites, the control of which is a matter for voluntary action by flock masters. The Ministry has issued a leaflet on the measures recommended to prevent or minimise the damage caused by the maggots and is also making a special grant, on the recommendation of the Agricultural Research Council, for research into this problem at the University College of North Wales, Bangor.

HORSE-DRAWN TRAFFIC, LONDON

Mr. DAY asked the Minister of Transport whether he can make any further statement with reference to inquiries he has recently made from the users of horse-drawn vehicles in the important streets of London respecting the time it would take to substitute mechanical transport and whether it would be practicable; and what decision, if any, he has arrived at regarding the elimination of horse-drawn traffic during certain hours in the London area?

Sir A. LAMBERT WARD: I have been asked to reply. My right hon. Friend has given formal notice of regulations restricting the use of selected streets in Central London by horse-drawn and other slow-moving traffic, but he has not yet completed his examination of certain representations received.

Mr. DAY: Can the hon. and gallant Member say when the regulations of which he has given notice will be published?

Sir A. LAMBERT WARD: I will ask my right hon. Friend to communicate with the hon. Member.

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POULTRY (BLOOD-TESTING)

Mr. A. DUCKWORTH asked the Minister of Agriculture whether he is aware of the inconvenience caused to poultry breeders by the delay in reaching decision with regard to a reduction of charges for poultry blood-testing at the Weybridge laboratories; and whether he can state when a decision on this question will be reached?

Mr. W. S. MORRISON: The charges for poultry blood-testing at the Weybridge Laboratory have remained unchanged for several years. I am aware that other laboratories make lower charges, and I am considering representations to reduce the scale at Weybridge. While any alteration in the present scale is improbable before the end of the current season any changes that may be decided upon would, I hope, become operative before the next seasonal tests begin.

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SCOTLAND (MILK MARKETING SCHEME)

Captain W. T. SHAW asked the Secretary of State for Scotland whether he has received the report of the committee of investigation for Scotland on the complaint made by the Association of Certified and Grade A (T.T.) Milk Producers regarding the position of the producers of Grade A (T.T.) milk under the Scottish milk marketing scheme; and, if so, what are the committee's findings and what action does he propose to take in the matter?

The SECRETARY OF STATE FOR SCOTLAND (Mr. Elliot): The Committee's report on the complaint has been received. The Committee find that the provisions of Section 24 (3) (*d*) of the scheme, under which producers selling milk through the agency of the Board qualify for payment of premiums in respect of the grade or quality of their milk only if it is sold at a price exceeding the price of ordinary milk, are contrary to the interests of producers of Grade A (T.T.) milk within the area of the scheme and are not in the public interest. The position of Grade A (T.T.) milk producers in relation to the Milk Marketing Scheme in England is also at the moment under examination, and there are general questions involved in both countries which will require consideration in the light of the results of these two inquiries. In the circumstances, I propose to defer a decision on the report of the Scottish Committee in the meantime.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Jan. 4th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, 4.30 p.m.

Jan. 4th.—N.V.M.A. Committee Meetings, 2, Verulam Buildings, Gray's Inn, W.C.1: Finance and General Purposes, 11.30 a.m.; Organising 2 p.m.; Appointments, 3 p.m.

Jan. 5th.—N.V.M.A. Council and Committee Meetings. Meeting of Council, Connaught Rooms, Great Queen Street, W.C.2, 2.30 p.m. Meetings of Committees, 2, Verulam Buildings, Gray's Inn, W.C.1: Parliamentary, 10 a.m.; Veterinary Officers' and Public Health, 11 a.m.; Joint Meeting of Veterinary Officers' and Public Health, and Parliamentary, 12 noon.

Jan. 8th.—R.C.V.S. Council Meetings.

Jan. 15th.—V.V.B.F., Ladies' Guild: Dance, Princes Galleries, Piccadilly, W.

Jan. 22nd.—Annual Meeting and Dinner, Royal Counties Division, N.V.M.A., Caversham Bridge Hotel, Reading, 6 p.m.

Feb. 26th.—Annual Dinner and Dance of the Yorkshire Division, N.V.M.A., at Leeds.

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PERSONAL

Major Plunkett Injured While Hunting.—We regret to learn that Major James J. Plunkett, O.B.E., of the Royal Army Veterinary Corps, is detained in Melton Mowbray Hospital with abdominal injuries, received on being thrown during a gallop with the Quorn, when his horse fell backwards on to him. Major Plunkett, who is a well-known member of the Melton Hunt, has been stationed at the Melton Mowbray Army Remount Depôt for several years.

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GENERAL OBITUARY

SIR JOHN BLAND SUTTON

British surgery has lost an exponent in the true Hunterian tradition in the death of Sir John Bland Sutton, which took place on Sunday last, for it is said of him that had he not become a surgeon he would have been a great naturalist. He excelled in the observation of detail and combined accuracy of diagnosis with remarkable rapidity as an operator. Bland Sutton was among the earliest surgeons at the Middlesex Hospital to undertake abdominal operations.

He had travelled much from the time in 1880 when he visited the medical schools of Paris and Vienna as a poor student to his extended

tours in Ethiopia and South America. From all his excursions he brought back new facts and turned them to good account in his writings and speeches. The *Times* records, as an instance, the fact that the science of the bull-ring in Spain having especially attracted him, he described the physiological explanation of the various steps designed to weaken the muscles of the bull's neck and finally to bring the animal into such a position that the matador could use the espada with deadly effect. In addition to purely professional works he was the author of "Man and Beast in Eastern Ethiopia," "Men and Creatures in Uganda," and "The Story of a Surgeon."

Always liberal in dealing with the fortune he had made by practice, he gave large subscriptions to the various students' funds at his medical school, and, finding that assistance was needed to provide additional scientific research at the Middlesex Hospital, he founded and endowed "the Bland-Sutton Pathological Institute," which was opened without any ceremony in 1914.

At the Royal College of Surgeons he was Hunterian Professor of Comparative Anatomy and Surgery from 1887-89; Erasmus Wilson Lecturer, 1885-87; Bradshaw Lecturer in 1918, and Hunterian Orator in 1923. He was elected a member of the Council in 1910, served the office of President from 1923-25, and was elected one of the trustees of the Hunterian Collection. When the Association of Surgeons of Great Britain and Ireland was founded he was chosen the first President in 1919, and in 1920 he served the important office of President of the Royal Society of Medicine, having been in 1914 President of the Medical Society of London.

During the War, after first serving as a Captain attached to the 3rd London General Hospital, he was placed on an Appeal Board in 1916 and was directed to collect the specimens of gunshot injuries which form a unique display and are at present housed in the Museum of the Royal College of Surgeons.

He was appointed prosector at the Zoological Gardens as early as 1881, and from that time onwards his interest in the Zoological Society never waned, and the supervision of its expansion was one of the great pleasures of his later life.

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Dr. Edoardo Perroncito

In connection with the notice of the death of Dr. Perroncito, appearing in our last issue, Mr. E. L. Taylor, M.V.Sc. writes: "Although carbon tetrachloride was discovered as early as 1849, its anthelmintic properties remained unsuspected until 1921 when they were revealed by the work of M. C. Hall. Perroncito and the other early workers on hookworm disease, among other drugs, used thymol, B-naphthol, extract of male fern and essence of eucalyptus.

"As stated in your notice, Perroncito's name will always be associated with the determination of the cause of the St. Gothard tunnel disease. Although the hookworm was discovered as early as 1838 (by Dubini), and had been associated with anaemia by workers in Egypt in 1866, no one guessed its real importance until Perroncito, in 1880, associated it with the severe epidemic of anaemia which broke out in the workers engaged in the construction of the St. Gothard tunnel.

"Perroncito's theory met with a large amount of opposition from many quarters but he held firmly to it and lived to see ancylostomiasis generally recognised as one of the most important diseases of man in hot climates."

LIVERPOOL DEGREE OF B.V.Sc.

Following is the University of Liverpool, School of Veterinary Science, Examination List for December, 1936, in connection with the University Degree of B.V.Sc.

Second Examination.—Arthur, G. H., Carr, W. H., Dalby, Mary; 3. 4. Hanbury, D. G., McCay, Joan R., Shaw, G. D., Smallwood, Ethel, Sutton, D. O., Willis, G. A.

3. Distinction in Physiology (including Histology) and Biochemistry.

4. Distinction in General Embryology.

Third Examination. *Part I.*—Cassar, A. J., Dransfield, J. W., France, W. H., Furber, T. R., Hancock, J. L., Williams, R. E., Wood, R. B.; *Part II.*—Cassar, A. J.; 1. Firth, T. B., France, W. H., Furber, T. R.; *Part III.*—Cassar, A. J., 2. Firth, T. B.

1. Distinction in Pharmacology, General Therapeutics and Toxicology.

2. Distinction in Genetics.

Fourth Examination (*New Regulations*).—Bonallo, T. G., Kieran, H., Tutton, E. A.

Final Examination (*Old Regulations*). *Part I.*—Needham, A. J. E.; *Part II.*—Brock, Doris M., O'Neill, P. A. F.

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ARMY VETERINARY SERVICE

Among the appointments in India recently made by the Commander-in-Chief is that of Major T. L. O'Shea, R.A.V.C., as D.A.D.V.S., Lahore District.

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VETERINARY T.T. CERTIFICATES IN WARWICKSHIRE

The action of the County Public Health Committee in refusing to accept, in regard to tuberculin tested milk, the certificates of veterinary surgeons other than those on the county staff was described as "unnecessarily arbitrary" at a meeting of the Executive Committee of the Warwickshire branch of the National Farmers' Union, when regret was expressed that the certificates of Birmingham official inspectors were not recognised.

Arising out of the report of the County Milk Committee, the County Secretary said he had approached the County Medical Officer of Health in connection with the inspection of dairy herds, but had been told that certificates of tuberculin testing and clinical examination of animals issued by veterinary inspectors other than those on the County Council staff could not be accepted by that body.

In view of the fact that the certificates referred to had been issued by veterinary inspectors on the staff of the Birmingham Public Health Department, Mr. Percy Jaggard described this as "a dog-in-the-manger attitude."

Major Clarke said the attitude of the County authority was unnecessarily arbitrary, and other members supported the protest.

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SCARLET FEVER AT DONCASTER

An outbreak of scarlet fever is reported from Doncaster, many cases having occurred in the county borough and in the neighbouring rural district. All these patients had consumed raw milk from the same source, and it is reported that a milker on the farm in question has been found to be suffering from illness which is probably of scarlatinal origin. The local authorities are taking appropriate steps to prevent the spread of infection, and a medical officer of the Ministry visited Doncaster to give necessary advice and assistance.

ATTESTED HERDS IN ENGLAND AND WALES

Steady Progress of the Scheme

Since the beginning of August, when there were 117 attested herds in England and Wales, the number of herds in respect of which Certificates of Attestation are in force has risen to 180. These certificates are issued under the Tuberculosis (Attested Herd) Scheme (England and Wales) and cover herds in all parts of the country—from Cornwall to Cumberland, from Pembroke to Norfolk.

The most rapid increase has occurred in South Wales where in two counties alone there are now 82 "attested" herds as against 42 at the beginning of August.

All classes of cattle breeder and milk producer are represented on the Register. The Royal herd at Windsor was among the first to qualify for attestation. The majority of herds are owned by ordinary farmers who, apart from enjoying the satisfaction of taking part in a scheme which eventually should prove of great benefit not only to the farming industry but to the whole country, have found the material advantages of attestation to be well worth while.

The following statement shows the present position in each county:—

England

	No. of Herds		*No. of Herds*
Berks	6	Northants.	1
Bucks	2	Oxford	4
Cheshire	3	Somerset	5
Cornwall	1	Suffolk (East)	2
Cumberland	6	Suffolk (West)	11
Devon	2	Surrey	3
Essex	2	Sussex (East)	5
Gloucester	1	Sussex (West)	4
Hants.	4	Westmorland	1
Herts.	1	Yorkshire (North Riding)	1
Kent	13	Yorkshire (West Riding)	1
Lancs.	1		
Norfolk	2		

Wales

Cardigan	8	Merioneth	1
Carmarthen	54	Montgomery	4
Denbigh	1	Pembs.	29
Glamorgan	1		
	175		

The number of cattle in these herds is 6,871. A scheme having a similar object is in operation in Scotland administered by the Department of Agriculture for Scotland.

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CONFERENCE ON THE ACCREDITED MILK SCHEME

A conference to discuss "The Administration of the Milk (Special Designations) Order, 1936, with respect to Accredited Milk" will be held by the Royal Sanitary Institute, on Thursday, January 28th, at 2 p.m., at 90, Buckingham Palace Road, London, S.W.1.

Mr. Thomas Baxter, Chairman of the Milk Marketing Board, will preside, and the discussion will be opened by Dr. W. G. Savage, Medical Officer of Health, Somerset County Council, Mr. F. W. Medlock, M.R.C.V.S., Chief Veterinary Officer, Essex County Council, Mr. H. F. Long, Chief Sanitary Inspector, Hereford Rural District Council, and Mr. W. T. Price, Agricultural Organiser, Wiltshire County Council.

Invitations have been sent to local authorities in England and Wales to appoint representatives to this meeting. It is hoped that the conference will be thoroughly representative of the various interests concerned in the accredited milk scheme, and that as a result of the meeting an advance will be made towards uniformity in the administration of the Order and the granting of licences for producing accredited milk.

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MILK MARKETING BOARD INQUIRY

At the resumed inquiry at Middlesex Guildhall into the Milk Marketing Board scheme to include producers of tuberculin tested milk, Mr. Michael Rowe referred to the danger of a reduction in tuberculin tested milk if its producers were brought into the scheme.

Pointing out that such milk was more expensive to produce, and that if the producers came into the scheme it would mean a loss of 2d. a gallon to them, Mr. Rowe commented: "We say that if it does not drive us out of business it will cause us considerable loss which we cannot afford. You are asking the tuberculin tested producer to give up this 2d. so that a larger return may be given to manufacturing milk producers. You are asking the best class to contribute to the worst."

The Chairman of the Milk Marketing Board, he added, had stated that he had not considered what was the difference between production of ordinary milk and tuberculin tested milk. How could the Board be in a position to formulate terms on which tuberculin tested producers of this class of milk could come into the scheme? asked Mr. Rowe. In effect the Board were saying: "Come into the scheme. If we ruin you we will go and ask the Government for a subsidy."

"We would prefer," added Mr. Rowe, "to go on as we are now, charging reasonable prices, getting a reasonable return, not asking the Government to subsidise us or asking the Board to do anything for us."

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PATENT MEDICINES

Mr. Arthur Mortimer, Secretary of the Wholesale Drug Trade Association, giving evidence before the Select Committee on Medicine Stamp Duty, said his Association considered that retailers should be divided into two classes—chemists registered under the Pharmacy and Poisons Act, whose legitimate business it was to supply medicine to the public, and those who were not so registered. The unregistered retailers should pay an annual licence fee of one guinea, or, alternatively, they should pay two guineas annual licence fee and registered retailers one guinea.

Non-secret medicines of every description, as and when sold by chemists, and medicines dispensed by chemists, medical practitioners, dentists, or veterinary surgeons should be exempt from duty, he added.

The question of advertisements for remedies appearing in books of postage stamps was raised by Dr. J. W. Bone, Chairman of the Medico-Political Committee of the British Medical Association. Never in any circumstances, he said, should there be advertised or sold patent remedies which professed to cure certain diseases which the medical profession knew could not be cured by those remedies.

"We take a very great exception indeed to the advertisements in the Government stamp-books," he continued. "They have been publishing them for a long time." The medical Secretary of the Association had been in communication with the Postmaster-General's Department on the subject.

The Chairman (Sir John Ganzoni) said that the only application that the evidence on this subject had to the Committee was that they might add a recommendation to their report that

medicines or instruments stated to cure certain diseases should be taxed.

Dr. Bone.—If you tax them with that in view, we hope it will be a prohibitive tax.

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MAGGOTS AS TISSUE SCAVENGERS

It will be recalled that in our issue of May 2nd last (p. 567) we published an article by Mr. L. E. W. Bevan, M.R.C.V.S., of Southern Rhodesia, on "How Surgical Maggots Act." We reproduce below an annotation from *The Lancet* of October 31st as contributing further to the same subject—though it would appear that Mr. Bevan's article has escaped the attention of the *Lancet* annotator. From the dates of the references attached to the annotation it would seem that Mr. Bevan is entitled to the credit of priority for the observation that the larvae produce a proteolytic ferment which can be reproduced by culture.

The maggots of the flesh-fly have been used in America for the treatment of open necrotic lesions ever since the discovery during the late war that they had a beneficial effect on wounds that were accidentally infested. The larvae, in the actively growing stages, feed on dead and infected tissues, leaving behind relatively clean flesh that has a chance of healing. There are, however, several objections to the use of larvae, apart from the repugnance felt by a large proportion of patients so treated: the part must be immobilised; fully grown larvae migrate from the wound and burrow into the dressings to pupate; the dressings need skilled and constant attention; and the method is applicable only to shallow or widely opened wounds, for the larvae can find no air for their respiration in the recesses of narrow fistulae or potential cavities. In addition, suitable strains of clean fly larvae must be kept in cultivation.

The larvae can take food only in liquid form. This they make by the excretion of proteolytic enzymes, which are capable of acting externally. Several attempts to prepare active extracts of these enzymes have met only partial success in the United States, where the larvae themselves are in fairly extensive use. Dr. André Maurice, working under Professor Brumpt, in France, has prepared a "dealbumised" extract of larvae in the form of jelly. In his report no details of the mode of preparation are given, but Brown and Farber have prepared proteolytic pastes by grinding washed larvae, and it is probable that the "dealbumisation" removes some of the larval debris. Dr. Maurice reports a series of cases cured or greatly improved by use of the jelly. These include an appendicular abscess, chronic osteomyelitis, anal fistula, carbuncles, and ozaena. In most the course of the disease differs little from one to be expected without the use of the jelly, but in some there appears to have been a rapid solution and discharge of necrotic matter from long-standing suppurative processes, followed by quick healing.

The treatment is analogous to the separation of sloughs by the action of mammalian gastric enzymes, but with enzymes of far greater lytic potentiality. The jelly confers most of the benefits of the larval treatment, and the difficulties of breeding, applying and maintaining larvae, the need for immobilising the patient and the aesthetic objections to wound infestation with maggots disappear. If active preparations will keep, and can be prepared free from bacterial contamination, there is no reason why they should not receive a thorough trial in this country.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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VETERINARY TRAINING AND THE REQUIREMENTS OF AGRICULTURE

To the Editor of the Veterinary Record

Sir,—I recall an excellent contribution of Colonel Rainey's from British Columbia, concerning the latest view as to the cause of fistulous withers; a letter from Queensland gave us interesting observations of no particular relevancy, and now a tale of foreboding and castigation marks his arrival in Western Australia.

Whilst sympathising with the settlers of Margaret River in their desire for skilled veterinary aid, I recognise that the remedy is largely in their own hands. If there is work in that region sufficiently remunerative to justify the residence of a veterinary surgeon, one could be found. That there is, is doubtful—for reasons which will be apparent later, and should not escape the Colonel's notice on a more intimate acquaintance with Australian conditions.

The Director of Agriculture did not imply surely that qualified veterinarians are only concerned with disease of an epidemic character, etc., but that departmental veterinarians could not be expected to function as general practitioners. Why should the Government supply a service which it is up to the farmers themselves to procure if deemed essential?

I disagree that the student who "conscientiously sees practice in Britain to-day is likely to see more of cats and dogs than of cows and sheep." There are, I believe, approximately 400,000 cows more in Britain to-day than a generation ago, and great increase in the number of swine. If his succeeding sentence be true, it ill-bespeaks the ability or readiness of practitioners (including contemporaries of the Colonel) to impart that dexterity and art to the students whom they have accepted in their practices. I do not consider it true, but regard it rather as the lament of age for the short-comings of youth—a theme as old as time.

On many a hot afternoon I have watched dairy stock come under the hammer in Lismore, which is the centre of the richest dairying country in New South Wales. £10 was reckoned about top price for good-class forward springers, pedigree animals fetching perhaps £12. In less favoured districts I have seen grade Jersey cows, freshly calved, sold for as low as 30s., and plenty at £5 and £6. The average milk yield of cows in the Commonwealth is approximately 150 gallons a year. I once bought my pick of 200 horses for £18, and have seen serviceable hacks sold for 30s. and even sixpence. How, then, is a skilled practitioner going to make a respectable living, with stock of such value forming a large proportion of his potential patients?

Two factors combine to prohibit private practice in Australia—the low value of the ordinary run of horses, cattle, and sheep, and the distances to be covered attending cases, due to the larger holdings made necessary by the comparatively low carrying capacity of the land—varying, as a rule, from one cow to three acres, to one sheep to five and even twenty acres. Will Colonel Rainey bear in mind the

fact that unskilled labourers in New South Wales received, in my time, a basic weekly wage of £4 5s. 0d. plus 5s. for each child? To expect a man of intellect and ambition to adopt a profession which will yield him £300 to £500 a year in a country where the wage index is so high and living correspondingly costly, is foolishness.

The Melbourne Veterinary College has had to close its doors for lack of students. The College in New South Wales has had a new lease of life through increasing demand for men for government and other appointments. It is situated, incidentally, not in the wide open spaces, but in the bosom of a city of over a million people. It is, however, freely admitted by the rural population of the State, that the number of cows in Sydney is surprising. Queensland has lately made the beginning of a training college; with what success perhaps Colonel Rainey can tell us.

My experience was that farmers' and graziers' sons of intelligence and some capital were not attracted by the financial prospects of the profession. A university graduate engaging in the hard graft of country practice for the wage of a higher-grade mechanic or artisan, would be an object of pitying contempt. Would Colonel Rainey encourage graduates to enter the R.A.V.C. with the pay and status of a farrier-sergeant?

Australia is a country of which I grew very fond, and hold in kindly remembrance, but I was never seriously tempted to engage in private practice anywhere in its different States. My income as a Government Veterinary Surgeon was limited to an ultimate £620 a year: too modest a sum to accept for the rest of one's life in a land of such high wages and cost of living. Starting from scratch in rural England, four years' practice has seen the attainment of an income exceeding that of the Chief Veterinary Surgeon of any Australian State. A boast—but let it illustrate that what one does, others can; and negative any encouragement to our Colleges to fashion graduates for careers in the Dominions at £300 a year, more or less.

Yours, etc.,
N. F. Pollock.

4, St. Mary's Road,
Cromer, Norfolk.
December 14th, 1936.

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SHOCK BY ELECTRICITY

To the Editor of the Veterinary Record

Sir,—In view of the correspondence on the above subject, may I be allowed to summarise the facts which I have tried to set out somewhat more fully in volume 3 of the "Animal Year-Book"?

It is known from human experience that an electric current passed through the head may produce either genuine unconsciousness or a nightmare state in which the power to move or speak is lost while consciousness still remains. Whether one condition or the other is produced depends on a number of different factors. The current used in the slaughterhouse appears, so far as the available data go, to be not far removed from the limit at which the nightmare state passes into genuine anaesthesia. Does it lie above or below that limit? In other words, does the slaughterhouse current produce unconsciousness in every case, or the nightmare state in every case, or sometimes one and sometimes the other? No conclusive evidence has been brought forward on this subject, though very confident opinions have been expressed. Some experimental work which is being done in Russia may throw light on the matter, but it would seem that we are still a long way from real knowledge.

Yours faithfully,
C. W. Hume.

284, Regent's Park Road,
Finchley,
London, N.3.
December 20th, 1936.

Diseases of Animals Acts
SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th Dec., 1936	26	29	21	1,133	2	2	20	57	37
Corresponding period in									
1935	24	26	—	—	4	7	58	103	60
1934	16	18	14	2,253	3	3	52	96	65
1933	10	10	—	—	3	3	90	70	33
Total 1st January to 15th December, 1936	431	507	59	4,744	103	245	221	1,812	1,236
Corresponding period in									
1935	362	417	50	11,787	96	218	440	1,965	1,199
1934	371	419	75	9,906	112	184	639	1,727	981
1933	278	324	87	7,805	128	216	525	1,366	890

Note.—The figures for the current year are approximate only.

§ Excluding outbreaks in Army Horses.